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AN ABORIGINAL GIRDLE

By EDGAR R. WAITE, F.L.S., C.M.Z.S., DIRECTOR, S.A. MUSEUM

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AN ABORIGINAL GIRDLE.

By EDGAR R. WAITE, F.L.S., C.M.Z.S., DIRECTOR, S.A. MUSEUM.

Plate v and Text fig. 351.

THE native girdle is the property of Mr. Norman Napier Birks, and I am indebted to him for permission to describe it. It was obtained from "Northern Queensland," but further information is not available.

The girdle is 2590 mm. or 8½ ft. in length, and probably encircled the waist of a native three times. It is formed of the cocoons of a moth, strung on sinnet, 160 cocoons having been used. The cocoons are characteristic of those of a moth of the Family Bombycidae, and probably belong to a species of the genus *Pinara*; Mr. Arthur M. Lea, our Entomologist, says that in the absence of the moth it is not possible to more specifically identify the cocoon. As is usual with members of the genus, the cocoons were built on to small twigs; on tearing them off a scar has been left and, in some cases, a portion of the twig still adheres: in stringing the cocoons the native has been careful to so pierce them that the scar or twig faces sideways, the appearance from back or front of the girdle not therefore being marred.

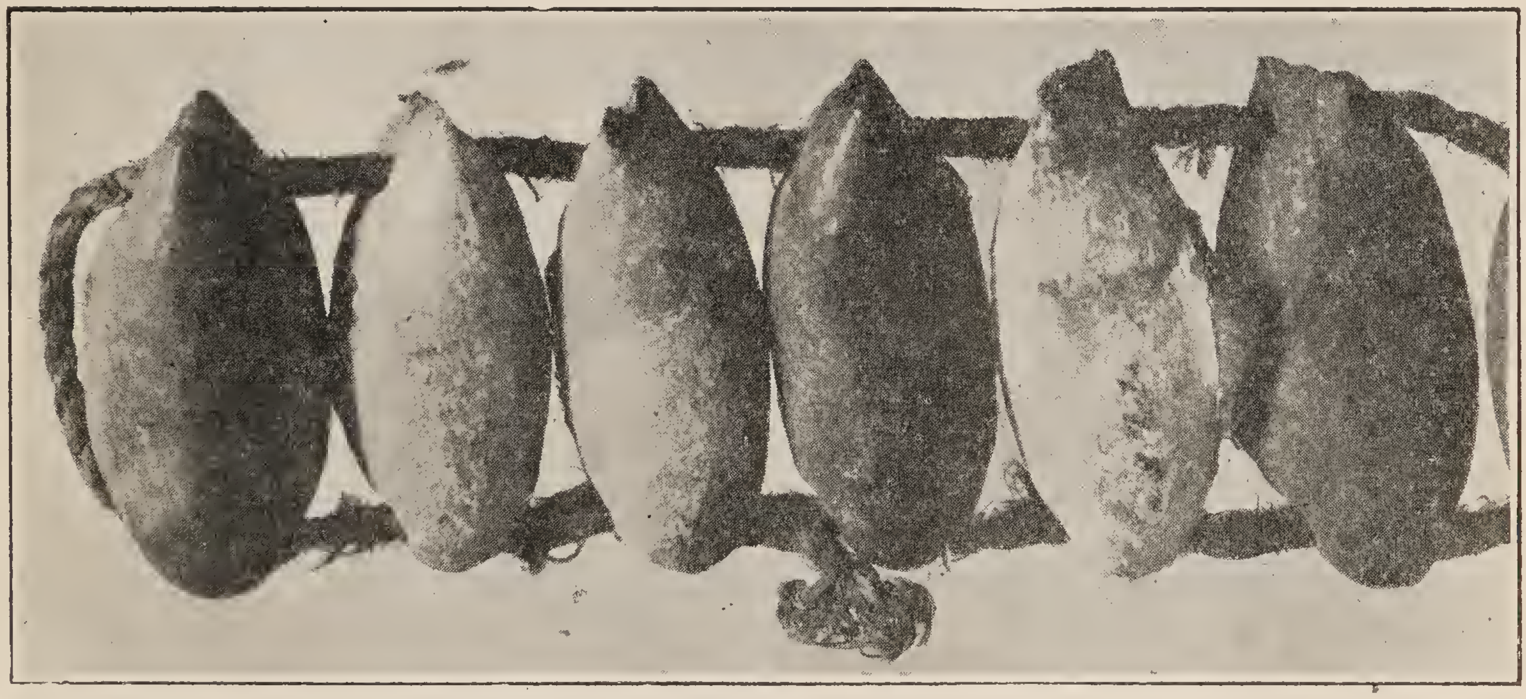


Fig. 351. Cocoons, natural size.

Each cocoon is about 40 mm. in length and 18 mm. in width; the open ends, or those from which the moth has emerged, have been squeezed, doubtless while the cocoon was fresh, and it is to be noticed that the squeezing has in all cases been done with the thumb or finger on the scar-bearing side; when strung, therefore, the flattened opening lies across the axis of the girdle.

The cocoons are pierced with two holes from the scarred side close to each end, the piercing having been done right through both walls. They are threaded on two-ply sinnet, which is returned through the last cocoon without joining. All the cocoons are strung facing the same direction, or, as we might say, right end up.

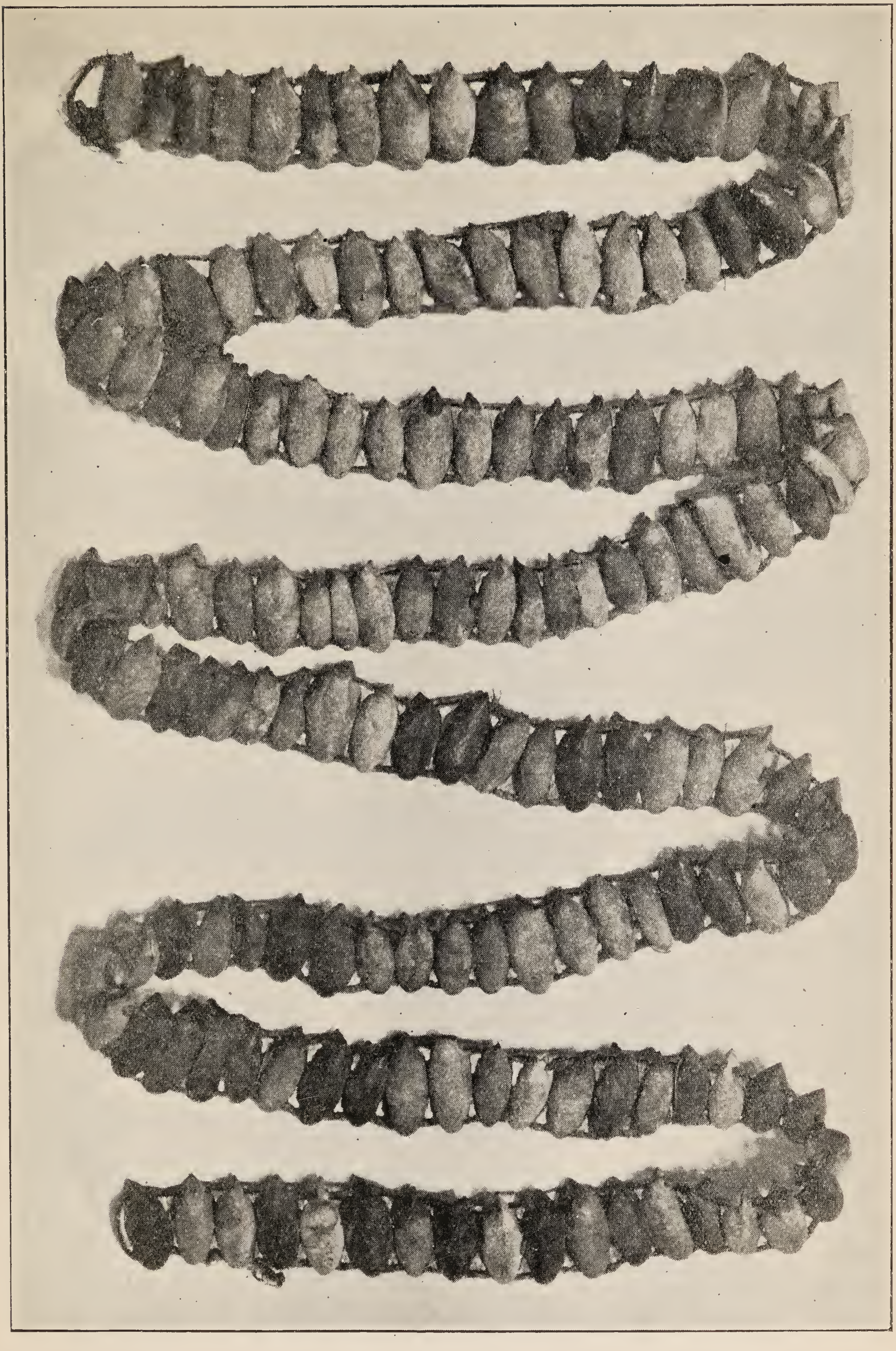
Each cocoon contains a half-thimble full of coarse gravel, and it is for the retention of this that the open ends have been squeezed and the lips kept in contact until the cocoons dried and hardened; how this was accomplished is not apparent or known.

When the girdle is shaken the gravel rattles within the dried cocoons, and there can be no doubt that it was worn in dancing.

Some of the cocoons are light grey in colour, others are brown, a distinction shown in the photograph (pl. v), which represents the entire girdle, the pinched ends of the cocoons being upwards. Fig. 351 shows the last six cocoons with the returning sinnet, the fifth last cocoon shows portion of the adherent twig.

Explanation of Plate v.

An aboriginal girdle from Northern Queensland, made of cocoons of a Bombycid moth.



AN ABORIGINAL GIRDLE

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THE MEDICAL PROFESSION FOR 6,000 YEARS.*

By JAMES J. WALSH, M. D., Ph. D., LL. D.,
New York,
Dean and Professor of Nervous Diseases and of the History of Medicine at Fordham University School of Medicine.

You now belong to what with the exception of the clerical (and even there is some doubt about that for physician and priest were one in the most ancient times we know of) is undoubtedly the oldest profession in the world. In welcoming you into it after the reception of your degrees, let me call your attention to the fact that the history of the profession you now enter upon dates back to the very beginning of the course of time and may be traced for as long as we have an account of men's actions in an organized social order. We are very prone in the modern time to think that what we are doing in each successive generation is of so much greater significance than what was accomplished before our time that it is really scarcely worth while to give much attention to the past. This self sufficient complacency with regard to the present would be quite unbearable only that each successive generation in its turn has had the same tendency and has expiated its fault by being thought little of by subsequent generations. We shall have our turn with those we affect to despise.

It is supposed to be particularly true in every department of science and above all in medicine that there is such a wide chasm between what we are doing now and what was accomplished by our for-

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*Address to the Graduates in Medicine at the First Annual Commencement of Fordham University School of Medicine, June 9, 1909.

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bears, no matter how intelligent they were in the long ago, that to occupy ourselves seriously with the history of medicine may be a pleasant occupation for an elderly physician who has nothing better to do, but can mean very little for the young man entering upon practice or for the physician busy with his patients. Medical history may be good enough for some book worm interested in dry as dust details for their own sake and perhaps because he rejoices in the fact that other people do not know them, but can have very little significance for the up to date physician. This is an impression that is dying hard just now, but it is dying. We are learning that there is very little that we are doing even now that has not been done before us and that above all the great physicians, no matter how long ago they wrote, always have precious lessons for us that we cannot afford to neglect even though they be 300 or 600 or 1800 or even 2500 years ago. At all of these dates in the past there were physicians whose works will never die.

In every department of human history the impression that we are the only ones whose work is significant has been receiving a sad jolt in recent years, and perhaps in no branch of science is this so true as in medicine. We are coming to realize how much the physicians and surgeons of long distant times accomplished, and above all we are learning to appreciate that they approached problems in medicine at many periods of medical history in the best scientific temper of the modern time. Of course there were abuses, but then the Lord knows there are abuses now. Of course their therapeutics had many absurdities in it, but then let us not forget that Professor Charles Richet, the director of the department of physiology at the University of Paris, declared not long ago in an article in the best known of

French magazines, the *Revue des deux mondes,* that the therapeutics of any generation of the world's history always contained many absurdities—for the second succeeding generation. The curious thing about it is that some of these supposed absurdities afterward come back into vogue and prove to be precious germs of discovery, or remedies of value that occasionally even develop into excellent systems of treatment.

Of course there were superstitions in the old days, but then there have been superstitions in medicine at all times. Anyone who thinks that we are without superstitions in medicine at the present time, superstitions that are confidently accepted by many regular practising physicians, must indeed be innocent. A superstition is in its etymology a survival. It comes from the Latin *superstes,* a survivor. It is the acceptance of some doctrine the reasons for which have disappeared in the progress of knowledge or the development of science though the doctrine itself still maintains a hold on the minds of man. Superstition has nothing necessarily to do with religion, though it is with regard to religion that doctrines are particularly apt to be accepted after the reasons for them have disappeared. In medicine, however, superstitions are almost as common as in religion. I shall never forget a discussion with two of the most prominent physicians of this country on this subject.

One of them was our greatest pathologist, the other a great teacher of clinical medicine who came into medicine through chemistry and therefore had a right to opinions with regard to the chemical side of medicine. We had been discussing the question of how much serious medical education there was in the Middle Ages and how in spite of the magnificent work done so many superstitions in medicine continued to maintain themselves. I remarked that it seemed impossible to teach truths to large bodies of men without having them accept certain doctrines which they thought truths but which were only theories and that they continued to uphold after the reasons for them had passed away. I even ventured to say that I thought that there were as many superstitions and that such as there were were as of great significance as those that maintained themselves in the Middle Ages. My chemical clinician brother on the right side said "let us not forget in this regard the hold the uric acid diathesis has on the English speaking medical profession." And the brother pathologist on the left side: "Well, and what shall we say of intestinal autointoxication?"

Perhaps you will not realize all the force of these expressions at the present time, but after you have been five years in the practice of medicine and have been flooded by the literature of the advertising manufacturing pharmacist and by the samples of the detail man and his advice and suggestion of principles of practice if you will listen to them, perhaps you will appreciate how much such frank expressions mean as portraying the medical superstitions of our time.

Let us turn from such discussion to the beginnings of the story of our medical profession as it has been revealed to us in recent years.

The first picture that we have of a physician in history is indeed one to make us proud of our profession. This first physician was I-em-hetep, whose name means "the bringer of peace." He had two other titles according to tradition, one of which was "the master of secrets," evidently in reference to the fact that more or less necessarily many secrets must be entrusted to the physician, but also, doubtless, in connection with the knowledge of the secrets of therapeutics which he was supposed to possess. Another of his titles was that of "the scribe of numbers," by which, perhaps, reference is made to his prescriptions which may have been lengthy, for there are many "calendar" prescriptions in the early days, but may only refer to the necessity of his knowing weights and measures and numbers very exactly for professional purposes. I-em-hetep lived in the reign of King Tchser, a monarch of the third dynasty in Egypt, the date of which is somewhat uncertain, but is about 4500 B. C. How distinguished an individual he was in his time may be gathered from the fact that the well known step pyramid at Sakkara, the old cemetery near Memphis, is attributed to him. So great was the honor paid to him that after his death he was worshipped as a god, and so we have statues of him as a placid looking man with a certain divine expression seated with a scroll on his knees and an air of benignant knowledge well suited to his profession.

I called attention in 1907[1] to the fact that the earliest pictures of surgical operations extant had recently been uncovered in the cemetery of Sakkara near Memphis in Egypt. These pictures show that surgery was probably an organized branch of medicine thus early, and the fact that they are found in a very important tomb shows how prominent a place in the community the surgeon held at that time. The oldest document after that which we have with regard to medicine is the *Ebers Papyrus*, the writing of which was done probably about 1600 B. C. This, however, is only a copy of an older manuscript or series of manuscripts, and there seems to be no doubt that the text, which contains idioms of a much older period, or indeed several periods, probably represents accumulations of information made during 2,000 or even 3,000 years before the date of our manuscript. Indeed it is not improbable that the oldest portions of the *Ebers Papyrus* owe their origin to men of the first Egyptian dynasties, nearly 5,000 years B. C. To be members of a profession that can thus trace its earliest written documents to a time seven thousand years ago, is an honor that may be readily appreciated and that may allow of some complacency.

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[1] *Journal of the American Medical Association*, November 8, 1907.

There is a well grounded tradition which shows us that an Egyptian monarch with whose name even we are familiar, though we may not be able to pronounce it very well—he was Athothis the son of Menes—wrote a work on anatomy. The exact date of this monarch's death is sometimes said to be 4157 B. C. We have traces of hospitals in existence at this time and something of the nature of a medical school. Indeed, one may fairly infer that medical education which had been developing for some time, probably for some centuries, took a definite form at this time in connection with the temples of Saturn. Priests and physicians were the same, or at least physicians formed one of the orders of the clergy and the teachers of medicine particularly were clergymen. This tradition of close affiliation between religion and medicine continued down to the fifteenth century. How few of us there are who realize that until the fourteenth century the professors of medicine at the great universities were not married men, because members of the faculty, as is true at the present time of many members of the faculty in the English universities, were not allowed to marry. The old clerical tradition was still maintaining itself even with regard to the medical teachers.

Perhaps the most interesting thing about this early history of medicine in Egypt is that with the very earliest dawn of medical history, we have traces of highly developed specialism in medicine. There were thirty-six departments of medicine or at least there were thirty-six medical divinities who presided over the particular parts of the human body. In the larger temples at least there was a special corps of priest physicians for each one of these departments. Herodotus, the father of history, is particularly full in his details of Egyptian history, and though he wrote about 400 B. C., nearly 2,300 years ago, his attention was attracted by this highly developed specialism among the Egyptians. He tells us in quaint fashion "Physicke is so studied and practised with the Egyptians that every disease hath his several physician, who striveth to excell in healing that one disease and not to be expert in curing many. Whereof it cometh that every corner of that country is full of physicians. Some for the eyes, others for the head, many for the teeth, not a few for the stomach and the inwards."

It is interesting to realize that the same state of affairs upon which you young graduates will come now that you are going out to find an opportunity to practise for yourselves at the end of the first decade of the twentieth century, is not very different from that which the great Father of History chronicles as the state of affairs among the Egyptians between 600 and 1,000 before Christ,—let us say about 3,000 years ago. You too will find that every corner is full of physicians, some for the eyes, others for the head, many for the teeth, not a few for the stomach and everything else under the sun and the canopy and the hat. After a time you will probably find that some little corner has been left for you, and you will work hard enough to get into it first, and then to fill it afterward. The story of how young physicians have got on in their first few years has probably been interesting at all times in the world's history. I think that I know about it at five different periods, and in every one of these there seemed to be no possible room, and yet somehow room was eventually found, though only after there had been a struggle, in the midst of which a certain number of the young physicians found another sphere of activity besides medicine.

Of course it is easy to think that these specialties did not amount to much, but any such thought is the merest assumption. A single instance will show you how completely at fault this assumption is. Dentistry is presumed to be a very modern profession. As a matter of fact mummies were found in the cemetery of Thebes whose bodies probably come from before 3,000 B. C., who have in their teeth the remains of gold fillings that were well put in, and show good workmanship, nearly 5,000 years ago. After dentistry the specialty that we would be sure could not have had any significant existence so long ago would be that of ophthalmology. As a matter of fact it is with regard to the knowledge of eye diseases displayed by these early teachers of medicine that the *Papyrus Ebers* is most startling. It was especially full in diagnosis and contained many valuable hints for treatment. As for laryngology and rhinology, one of the earliest medical records that we have, is the rewarding by one of the kings of Egypt of an early dynasty, (nearly 4,000 B. C.,) of a physician who had cured him of a trouble of the nose of long standing, that seems to have interfered with his breathing.

It is easy to think in spite of all this, that the Egyptians did not know much medicine; but only one who knows nothing about it thinks so. According to Dr. Carl von Klein, who discussed the Medical Features of the Ebers Papyrus in the

Journal of The American Medical Association about five years ago, over 700 different substances are mentioned as of remedial value in this old time medical work. There is scarcely a disease of any important organ with which we are familiar in the modern time that is not mentioned here. While the significance of diseases of such organs as the spleen, the ductless glands, and the appendix was of course missed, nearly every other pathological condition was either expressly named or at least hinted at. The papyrus insists very much on the value of history taking in medicine, and hints that the reason why physicians fail to cure is often because they have not studied their cases sufficiently. While the treatment was mainly symptomatic, it was not more so than is a great deal of therapeutics at the present time even in the regular school of medicine. The number and variety of their remedies and of their modes of administering them is so marvelous, that I prefer to quote Dr. von Klein's enumeration of them for you:

"In this papyrus are mentioned over 700 different substances from the animal, vegetable, and mineral kingdoms which act as stimulants, sedatives, motor excitants, motor depressants, narcotics, hypnotics, analgesics, anodynes, antispasmodics, mydriatics, myotics, expectorants, tonics, dentifrices, sialogogues, antisialics, refrigerants, emetics, antiemetics, carminatives, cathartics, purgatives, astringents, cholagogues, anthelmintics, restoratives, hæmatics, alteratives, antipyretics, antiphlogistics, antiperiodics, diuretics, diluents, diaphoretics, sudorifics, anhydrotics, emmenargogues, oxytocics, ecbolics, galactagogues, irritants, escharotics, caustics, styptics, hæemostatics, emollients, demulcents, protectives, antizymotics, disinfectants, deodorants, parasiticides, antidotes, and antagonists."

Scarcely less interesting than the variety of remedies were their methods of administration:

"Medicines are directed to be administered internally in the form of decoctions, infusions, injections, pills, tablets, troches, capsules, powders, potions, and inhalations; and externally, as lotions, ointments, plasters, etc. They are to be eaten, drunk, masticated, or swallowed, to be taken often once only—often for many days—and the time is occasionally designated—to be taken mornings, evenings, or at bedtime. Formulas to disguise bad tasting medicaments are also given." We have no advantage over the early Egyptians even in elegant prescribing.

With all this activity in Egypt, it is easy to understand that the other great nations of antiquity also have important chapters in the history of medicine. The earliest accounts would seem to indicate that the Chaldeans, the Assyrians, and the Babylonians all made significant advances in medicine. It seems clear that a work on anatomy was written in China about the year 2,000 B. C. Some of the other Eastern nations made great progress. The Hindoos in particular have in recent years been shown to have accomplished very good work in medicine itself. Charaka, a Hindu surgeon, who lived not later than 300 B. C., made some fine contributions to medical literature in Hindostani. There were hospitals in all of these countries, and these provided opportunities for the practice of surgery. Laparotomy was very commonly done by Hindu surgeons, and one of the rules enjoined on Hindu students was the constant habit of visiting the sick and seeing them treated by experienced physicians. Clinical teaching is often spoken of as a modern invention, but it is as old as hospital systems, and they go back to the dawn of history.

It is among the Greeks, however, that the most important advances in medicine, so far as we are concerned, were made. This is, however, not so much because of what they did as from the fact that they were more given to writing, and then their writings have been better preserved for us than those of other nations. The first great physician among the Greeks was Æsculapius, of whom, however, we have only traditions. He is fabled to have been the son of Apollo, the god of music and the arts, and therefore to have been a near relative of the muses. The connection is rather interesting, because sometimes people try to remove medicine from among the arts that minister to the happiness of man, and place it among the sciences whose application is for his profit. Medicine still remains an art, however. The temples of Æsculapius were the first hospitals, though the priests were not the only ones who practised medicine, for there were laymen who after having served for some time in the hospitals, wandered through the country under the name of Asclepiads treating people who were not able to go to the hospitals or shrines. These evidently then were the first medical schools in Greece as well as the first hospitals.

Six hundred years after Æsculapius came Hippocrates, of Cos, the Father of Medicine. He undoubtedly had the advantage of many Egyptian medical traditions and other Oriental medical sources, as well as the observations made in the hospitals and shrines of Æsculapius. He wrote some great works in medicine that have never grown old. Young men do not read them, old men who are over-persuaded of how much progress is being made by their own generation in medicine neglect them. The busy practitioner has no time for them. The great teachers of medicine whom all the professors look up to and who think for us in each generation turn fondly back to Hippocrates, and marvel at his acumen of observation and his wonderful knowledge of men and disease. Sydenham thought that no one had ever written like him, and in our turn we honor Sydenham by calling him the English Hippocrates. Boerhaave, Van Swieten, Lancisi, the great fathers of modern clinical medicine, turned with as much reverence to Hippocrates as does Osler, the regius professor of medicine at Oxford, in our twentieth century. Hippocrates wrote 2,500 years ago, but his writing is eternal in interest and value.

The famous oath of Hippocrates, which used to be read to all the graduates of medicine, well deserved that honor, for it represents the highest expression of professional dignity and obligation. There is a lofty sense of professional honor expressed in it that cannot be excelled at any period in the world's history. Among other things that Hippocrates required his adepts in medicine, his medical students when they graduated into physicians, to swear to were the following: "I will follow the system of regimen which according to my ability and judgment I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous. I will give no deadly medicine to man, woman, or child born or unborn. With purity and with holiness I will pass my life and practice my art. Whatever in connection with my professional practice, or not in connection with it, I see or hear in the life of men which ought not to be spoken of abroad, I shall not divulge, as reckoning that all such should be kept secret. While I continue to keep this oath inviolate it may be granted to me to enjoy life and the practice of my art respected by all men in all times; but should I trespass and violate this oath may the reverse be my lot."

It is sometimes thought that after the Roman medicine, which was an imitation of the Greek (though Galen well deserved a place by himself, and Galen is usually thought of as a Roman though he wrote in Greek and had obtained his education at Pergamos in Asia Minor), there was an interregnum in medicine until our own time. This is, however, quite as much of an assumption as to suppose that the Egyptians had no medicine—as we used to until we knew more about them—or that old time medicine is quite negligible because we were ignorant of its value. The Middle Ages had much more of medicine than we are likely to think, and just as soon as the great universities arose at the end of the twelfth and the beginning of the thirteenth centuries, medicine gained a new impetus and flourished marvelously. These university medical schools of the later Middle Ages are models in their way, and put us to shame in many things. According to a law of the Emperor Frederick II issued for the two Sicilies in 1241,[1] three years of preliminary study were required at the university before a student might take up the medical course, and then he had to spend four years at medicine, and practise for a year under the supervision of a physician of experience before he was allowed to practise for himself. The story of the medicine of this time is all the more wonderful because subsequent generations forgot about it until recent years, and supposed that all of this period was shrouded in darkness. It was probably one of the most brilliant periods in medical history. Some of the men who worked and taught in medicine at this time will never be forgotten.

Probably the greatest of them was Guy de Chauliac, a papal chamberlain whom succeeding generations have honored with the title of father of surgery. His great textbook, the *Chirurgia Magna,* was in common use for several centuries after his death, and is full of surgical teaching that we are prone to think much more modern. He trephined the skull, opened the thorax, operated within the abdomen, declared that patients suffering from wounds of the intestines would die unless these were sewed up, operated often for hernia in an exaggerated Trendelenberg position, with the patient's head down on a board, but said that many more patients were operated upon for hernia "for the benefit of the surgeon's purse than for the good of the patient." His directions for the treatment of fractures and for taxis in hernia were followed for full four centuries after his time. No wonder that Pagel, the great German historian, declared that "Chauliac laid the foundation of that primacy in surgery which the French maintained down to the nineteenth century." Portal in his *History of Surgery* declares that "Guy de Chauliac said nearly everything which modern surgeons say, and his work is of infinite price, but unfortunately too little read, too little pondered." Malgaigne declared "the *Chirurgia Magna* a masterpiece of learned and luminous writing."

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[1] For the complete text of this law, the first regulating the practice of medicine in modern times, also the first pure drug law, see Walsh's *The Popes and Science*. New York, Fordham University Press, 1908.

Chauliac's[2] personal character, however, is even more admirable than his surgical knowledge. He was at Avignon when the black death occurred and carried away one half the population. He was one of the few physicians who had the courage to stay. He tells us very simply that he did stay not because he had no fear, for he was dreadfully afraid, but he thought it his duty to stay. Toward the end of the epidemic, he caught the fever, but survived it, and has written a fine description of it. He was looked upon as the leader of surgery in his time, and this is his advice as to what the surgeon should do as given in the introductory chapter of his *Chirurgia Magna:* "The surgeon should be learned, skilled, ingenious, and of good morals: Be bold in things that are sure, cautious in dangers; avoid evil cures and practices; be gracious to the sick, obliging to his colleagues, wise in his predictions: be chaste, sober, pitiful, and merciful; not covetous nor extortionate of money; but let the recompense be moderate, according to the work, the means of the sick, the character of the issue or event, and its dignity." No wonder that Malgaigne says of him: "Never since Hippocrates has medicine heard such language filled with so much nobility and so full of matter in so few words."

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[2] For sketch of Chauliac see *Johns Hopkins Hospital Bulletin,* 1909, or *Catholic Churchmen in Science,* second series. Dolphin Press, Philadelphia, 1909.

The old time medical traditions of education which in the medieval universities produced such men as William of Salicet and Lanfranc and Mondeville and Guy de Chauliac, persisted during the next two centuries in the southern countries of Europe, and then were transferred to America through Spain. The first American medical school was not, as has so often been said, at my own Alma Mater, the University of Pennsylvania, which had its first lectures in 1767, while the Physicians and Surgeons of New York did not come for some ten years later and Harvard only in the following decade, but in the medical school of the University of Mexico, where the first lectures were held in 1578, and where a full medical school was organized before the end of the sixteenth century. In this medical school which during the seventeenth century came to have several hundred students, the university tradition of the olden time was well preserved.

Three years of preliminary study at the university were required before a student could take up the course in medicine, and four years of medical study were required before graduation. We have some of the textbooks, and know much about the curriculum of this old medical school, and in every way it is worthy of the old university traditions.

Unfortunately our universities in what is now the United States developed very slowly. Kings College (Columbia) did not become a university in the sense of having law and medical schools as well as an undergraduate department until the nineteenth century had almost begun. Harvard did not have a law school affiliated with it until the first quarter of the nineteenth century had almost run its course. The affiliations between the medical schools and the universities in these cases was only very slight, and the medical schools were entirely in the hands of the medical faculty, whose main purpose during a great part of the nineteenth century was to make medical studies as short as possible and as inexpensive as they could possibly be made for the faculty, because that left so much more of the fees to be absorbed by the historic septennate of professors who ruled and managed the university. The consequence was that during most of the nineteenth century two terms of four months each were all that was required for the diploma in medicine in American medical schools. Three schools maintained a very high standard by requiring twenty weeks in each of two calendar years. The medical school that was considered one of the best in the country, and whose graduates obtained the highest marks in the army and navy examinations, that of the University of Virginia, required but one year's attendance—nine months in all—and then gave the doctor's degree.

It may be as well to say that the doctor's degree or diploma was a license to practise. There were no State regulations for the practice of medicine, and no matter how obtained, a diploma allowed practise. As some one has well said the diploma, then, was a license to practise, not medicine, the Lord knows! but to practise on one's patients until one had learned some medicine. It is out of this slough of despond in medical education that we have climbed in the last thirty-five years. We are getting back to the old time university traditions. Let us hope that we shall not allow ourselves to get away from them again. There are ups and down in medical practice and medical fashions and medical education, and all depends on the men who compose the profession at any one time, and not on any mythical progress that holds them up and compels them to do better than those who went before them.

It is to you to-day, entering on this profession, that we look to do your share in keeping up the dignity of the medical profession and in maintaining standards in medical education. We have a glorious tradition of 6,000 years behind us with the great men of the profession worshipped as gods at the beginning, because men thought so much of them, and remembered fondly as great masters when they came in the aftertime. From I-em-hetep through Æsculapius and Hippocrates and Galen and Guy de Chauliac and Sydenham and Boerhaave down to our own time, the men whom we delight to honor are the ones who did not work with an eye single to their own success, but who tried above all to do things for humanity and for the profession to which they belonged. The man who is successful as a money maker in his profession is only doing half his duty. He must make medicine as well as money, that is, he must by his observations help others to recognize and treat disease better than they did before, he must labor for the benefit of humanity, and above all he must see that there are no decadence of professional spirit and no deterioration of medical education as far as his infl ence can go. It is men of this kind that we hope to send forth from Fordham, and you stand in the van of them all, and I wish you God-speed.

110 West Seventy-fourth Street.

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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
HEALTH OF ANIMALS BRANCH

DOURINE IN CANADA

1904-1920

HISTORY, RESEARCH AND SUPPRESSION

BY

E. A. WATSON, V.S., (Capt. C.A.V.C.)
CHIEF ANIMAL PATHOLOGIST

OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

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INTRODUCTION.

Canadian experience with dourine extends over a period of fifteen years and covers the study and suppression of a rare and serious disease hitherto unknown in Canada.

Although the disease is one of the oldest recorded in veterinary literature and has been known to the Arabs and in certain countries of Asia and Africa for centuries, it is only within the past twenty-five years that the nature of it has come to be recognized and understood. The blood parasite *Trypanosoma equiperdum,* seen for the first time by Rouget, in 1894, was for a long time contested by leading veterinarians of Europe as being the specific cause of dourine, and the question was still in dispute ten years later when the disease made its first appearance in Canada.

It was then recognized by Inspector Burnett (1904), and immediately afterwards by Dr. Rutherford, then Veterinary Director General, who, as a result of his investigation and in the absence of positive proof, held to his conclusions and adopted a policy the wisdom of which was borne out by subsequent events. The long search for the specific cause of the disease and its discovery; the experimental work patiently and labouriously pursued year after year; the determination of specific serum methods of diagnosis, by the aid of which the disease was eventually suppressed; and the difficulties met with and overcome both by the veterinary inspectors in charge of the field work and by the pathologists in the laboratory—furnish an example of persistent and unrelenting effort and success achieved in an important problem of veterinary research and sanitary science.

This report includes a review and summary of papers and records published in the Annual Reports of the Veterinary Director General for the years 1904 to 1919, a general description of the disease, and a number of appendices.

It is presented by permission of Dr. F. Torrance who for the past seven years has directed the work of suppressing dourine and has brought it to success.

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HISTORY, RESEARCH AND SUPPRESSION.

Review and Summary.

The disease was first observed in the province of Alberta, in the Lethbridge district, in the early spring of the year 1904. From the inquiries made in the neighbourhood it appeared probable that the disease had been introduced several years previously. Though the origin was never exactly located there is good reason for attributing it to animals brought in from the Western United States in which, among range animals, the disease was known to exist from time to time.

In March, 1904, Inspector Burnett, Chief Veterinary Officer of the Royal North West Mounted Police, reported the existence of dourine (Maladie du Coït) in a stallion and several mares, located near Lethbridge, Alberta. Dr. Rutherford, Veterinary Director General, Dr. Hargrave, of Medicine Hat, Dr. Davison, of the United States Bureau of Animal Industry, and other veterinarians examined the affected animals and agreed upon the diagnosis.

A quarantine station of 1,800 acres of fenced land was thereupon established near Lethbridge, where all suspected animals were gathered in and held under observation. Under the Animal Contagious Diseases Act, 1903, regulations relating to this disease were formulated and brought into force (Appendix No. 5). Provision was also made for the slaughter of infected animals and the payment of reasonable compensation to the owners.

The quarantined animals were re-examined after an interval of several months and when it was expected that acute or well-marked symptoms of the disease would have developed. Dr. Rutherford reported that instead of finding an aggravation of symptoms and a progressive state of disease, a surprise was encountered in that no well-marked case was presented, that many of the affected animals had improved in a marked degree, and that there was not among them any one case sufficiently pronounced to warrant an order for its destruction.

Doubts began to arise as to whether the disease was actually dourine or some other. Many examinations of blood and of the body fluids obtained from affected animals were made in the field, and specimens were sent to various laboratories, but without revealing any trace of the presence of the parasite or any definite information as to the nature of the disease. Dr. Rutherford drew attention to the fact that dourine as an indigenous disease in Asia and in Africa had become more irregular and uncertain in its course and manifestations in Europe and in America, and, probably, still further modified under the peculiar climatic conditions of the northwest provinces of Canada. The decision was made not to immediately adopt a policy of slaughter, but to hold the suspected animals for a further period in quarantine until more satisfactory evidence was obtainable, and also for the purpose of acquiring as much information as possible as to the behaviour of the disease in this country.

In May, 1905, the animals were again examined by Dr. Rutherford and accompanying veterinary officers. In some cases the disease was found to have made progress, in others there was little change from conditions noted on previous occasions. One hundred and sixteen horses were destroyed; a considerable number held over for further observation. Special officers were detailed to deal with the disease and were authorized to order the slaughter of any clearly marked cases coming under their notice.

In September, 1905, it was decided to slaughter all the animals at the quarantine station excepting a few which had been under observation for upwards of twelve months and appeared to be healthy. It was then arranged to utilize the existing quarantine station for experimental work in connection with dourine, and Dr. Hadwen, an inspector at Nelson, B.C., was transferred to Lethbridge and placed in charge, with a number of condemned animals at his disposal. Three infected animals were sent to the Biological Laboratory, Ottawa, for study and experiments.

Investigations were continued in the field and in the laboratories during the winter of 1905-06 and the following summer. The disease was found to exist in various parts of southern Alberta, and by October 31, 1906, 412 animals had been destroyed.

At the Lethbridge quarantine station breeding experiments were conducted with the object of ascertaining whether apparently recovered mares would bear healthy offspring or would remain sterile. Diseased and healthy stallions were employed in these experiments. Several slightly affected mares were spayed in the hope that such cases could be spared destruction and usefully employed for work purposes only. The search for the dourine parasite *Trypanosoma equiperdum* was kept up continuously both at Lethbridge and at Ottawa. Microscopical examinations were made of great numbers of specimens; dogs and other laboratory animals were inoculated with blood and material obtained from diseased tissues, but all were negative in result and every attempt to detect the parasite met with failure.

At the Biological Laboratory, Ottawa, Higgins and Watson had made a cytological study of the blood of dourined horses comparatively with the blood of normal horses and in certain diseases. It was found that the leucocyte formula in dourine differed from that in normal horses and in the other diseases studied, and was of some diagnostic value. A pathogenic trypanosome, *Tr. gambiense,* was maintained and studied in a series of laboratory animals, mainly with the idea of acquiring a knowledge of the habits and characteristics of a blood-haunting protozoan parasite closely allied to that of dourine. In October, 1906, Watson took over the investigation of dourine and removed to Lethbridge. In November and December of that year he discovered trypanosomes in the blood of native "cotton-tail" rabbits and in a species of northern deer-mouse caught on the quarantine grounds at Lethbridge. These findings created much interest at the time, being the first record of trypanosomes found in mammalian blood in Canada.

The important discovery of *Tr. equiperdum* was made in February, 1907, by Watson, in a dourined mare in which the disease had been recognized by Inspector Gallivan. The reproduction of the disease by inoculations of this parasite into healthy horses, and the recovery of the parasites from the typical lesions produced, removed all doubt as to whether the dourine of America was a trypanosome disease or not, and clearly established its identity with the dourine of Asia and Africa and of European countries. However, in Africa and Asia, where the disease exists in its most severe form, no great difficulty seems to have been encountered in detecting the parasite or in diagnosing the disease by its clinical manifestations. In Europe, on the contrary, the search for the trypanosome was for many years unsuccessful, the course of the disease was found to be irregular and uncertain, and diagnosis, as a rule, had to be based upon clinical symptoms, which, as often as not, were too vague and elusive to permit of satisfactory conclusions. In America it was already evident that the disease occurred in a still more insidious form and that frequently in the early stages of infection, which might continue for very lengthy periods, neither a characteristic symptom nor a warning sign of the disease was presented. Further, and far from being an invariably fatal disease, many infected mares retained or recovered apparent health, though suspected of being capable of transmitting the disease to the covering stallion. The better bred and especially the pure-bred imported animals of high commercial value were usually the most severely affected and the first to succumb. Prairie-bred animals of the native pony and broncho types were best able to resist or tolerate dourine infection and to lend themselves as carriers of it, and in the absence of any reliable means of recognizing them as such, constituted a frequent and dangerous source of infection. At this time large herds of horses lived and bred on the open ranges where natural conditions all favoured the spread of the disease.

The horse industry was thus faced with a serious menace and the Veterinary Department with the formidable task of overcoming it. The prospect of eradication in face of the apparently insurmountable difficulties in diagnosis did not look encouraging. It was decided to carry on research, to study the disease from its various aspects and, if possibe, devise a specific or accurate method of diagnosis which would enable the department to deal with dourine in an efficient and satisfactory manner and to finally suppress it in its entirety.

During the next five years, 1907-12, cases of dourine were discovered in a number of the breeding districts in the provinces of Alberta and Saskatchowan and reported on by Inspectors Gallivan and W. L. Hawke. The procedure when an animal was found affected was to secure the fullest possible history of the case, to trace all animals which had been in contact by breeding and to quarantine sick animals for an indefinite period, forbidding them to be bred, sold or removed without a special license. Periodical examinations were made by the inspectors in charge, and as soon as a clear case of disease had developed the animal was destroyed. But it happened quite commonly that no definite symptoms could be detected until well on into the second year of the disease, and that in consequence horse-breeding among such groups of animals, often several hundred in numbers, had to be prohibited for two and sometimes three years in succession. Even then there was no certainty that some latent carrier did not remain undetected. In fact, as became known later on, in any large outbreak of dourine and especially among prairie-bred animals, it is practically certain that such carriers do remain and can only be detected by specific methods of diagnosis. Although no better measures of control could be devised under the existing circumstances, the prolonged quarantine for observation purposes, the periodic examination by the veterinary inspectors and the maintenance of large breeding establishments or herds of brood mares which must not be used for breeding purposes, proved costly, onerous and unsatisfactory. These five years (1907-12), saw a great amount of research and experimental work accomplished at the Quarantine and Research Laboratory, Lethbridge. Besides the original trypanosome strain several others were obtained from different sources of dourine outbreaks. Parallel series of experiments were made with the different strains in a close study of the pathogenecity, life-history and variations in the virulence of *Tr. equiperdum.* The strains were maintained in horses; the evolution of the disease in its various phases was followed from year to year and many observations and experiments were made upon the survivors. Mares which had spontaneously recovered, some from a natural and others from an experimental infection, were successfully bred and raised healthy offspring year after year. It was found that these mares resisted reinfection and that the serum of such animals had immunizing properties. The experimental treatment of dourine was investigated both from a preventive and a curative point of view, immunizing sera and special drugs recommended in other trypanosome diseases, e.g., atoxyl and arsenophenylglycin, were employed and reported upon. The chief objective, that of determining a precise method of diagnosis, was always kept in view, and to that end the study of the serum properties of dourined animals was a continuous one. Serum reactions and serum methods of diagnosis were worked out and included a serum-globulin test, a trypanosome agglutination test and a precipitin test. Of these, the agglutination test was the more satisfactory but did not meet all requirements.

The winter of 1911-12 was spent by Watson in a study of trypanosome diseases in European laboratories. A German strain of dourine (Beschälseuche) and an African strain were obtained from the Imperial Health Institute, Berlin, and brought to Canada for comparative work. Good progress in the serum diagnosis of dourine was made during the year 1912. The Complement-fixation or Complement-deviation test,* after several modifications and improvements in technique had been made, was found to provide a specific, precise and uniform method of testing. As a means of diagnosis it answered all requirements and came into general use during the year 1913. Towards the end of that year a recurrence of the disease was reported in the southern districts of Alberta. The field investigations showed it to be of very wide extent and to cover the old centres of infection of the first known outbreaks occurring six to eight years previously. On one company's ranch 2,718 horses were involved, including a number of imported stallions and mares and several hundred animals of high grades and value. Blood was collected from every animal and sent to the laboratory. As a result of the first test over 400 animals were pronounced infected. Some scepticism was at first evinced by the owners as animals, apparently in perfect health, were condemned on the strength of a positive serum reaction. But as many of these animals began to show symptoms and when several had died, all opposition vanished and the owners were willing enough to have the animals slaughtered and compensated for, and to fully co-operate in stamping out the disease.

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*See Appendix No. 2, pags 16, for explanation and description of the Complement-fixation test for dourine.

The Complement-fixation test has since been employed wherever the disease has made an appearance in this country. It has proved of inestimable value as the main factor in the diagnosis and suppression of the disease, enabling an early and definite decision to be made—just as soon as blood can be collected and sent to the laboratory. Instead of holding suspected animals in quarantine for indefinite periods extending into years it has sufficed to apply the test and, after a short interval and to eliminate any doubtful reactors a retest. It was most fortunate that this test was available when the recurrence and wide extent of the disease became known in the years 1913 to 1916. During this period every effort was made to cover the whole field of the disease, and it was then that the heaviest toll was paid in slaughter and in compensation. The large Indian reservations situated within the infected area of southern Alberta were for long suspected of harbouring dourine. It was rarely possible to detect a case among the native ponies themselves but cases were frequently found among the better grades of animals of the neighbouring ranchers which from time to time strayed on to the Indian ranges. A serum test of these Indian herds indicated many cases of hidden infection and of dourine carriers. This was not surprising as the constant intermingling of herds, the Indian habit of letting young stallions go uncastrated until three or four years of age, and promiscuous breeding had given every facility for the scattering of infection. To drain out this remaining source the herds were gathered up and tested repeatedly at intervals of six months to one year, and the animals whose serum reacted positively in the complement fixation test were destroyed.

In connection with the serum-diagnosis of dourine over 40,000 laboratory tests were made during the period 1912-20.

Since the disease first came under departmental action and up to present date (1904 to 1920), 1,933 horses have been destroyed.

The figures year by year are to be found in the table of dourine statistics given below.

At the present day dourine appears to have been totally suppressed in Canada. If further outbreaks should occur or the disease be reintroduced it should never have an opportunity of gaining much headway now that there are the means of detecting it either in its initial or active stages or in its latent and hidden forms, and thus dealing with it promptly and efficiently.

Finally, the testing of all stallions imported into the country and stallions that are travelled through the country for breeding purposes would prevent the reintroduction of the disease and afford an adequate protection to the horse industry.

DOURINE STATISTICS (1904-20).

Year.	Horses destroyed.	Value.	Compensation
		$	$
1904–05	292	24,045 00	16,029 94
1905–06	120	10,210 00	6,806 48
1906–07	167	15,505 00	10,336 44
1907–08	49	5,175 00	3,449 92
1908–09	28	3,760 00	2,506 54
1909–10	37	5,130 00	3,419 98
1910–11	40	4,960 00	3,306 60
1911–12	18	2,610 00	1,739 99
1912–13	18	3,145 00	2,096 00
1913–14	471	73,115 00	48,743 33
1914–15	394	48,931 00	32,080 66
1915–16	228	26,085 00	17,389 65
1916–17	48	4,924 00	3,222 63
1917–18	16	2,011 00	1,340 66
1918–19	5	392 00	261 33
1919–20	2	105 00	70 00
	1,933	230,103 00	152,800 15

NOTE.—During the present year commencing April 1st, up to the time of going to press, November, 1920, not a single case of dourine has been reported. The final test of the last remaining herd under suspicion—about one thousand mares and stallions running upon an Indian Reservation—has been concluded, all the reactions being negative.

DOURINE.

THE NATURAL DISEASE.

As it occurs in Canada dourine infection is directly communicable from the diseased to the healthy animal by either the horse or the ass through the act of sexual union and in no other way. It is caused by a protozoan parasite named *Trypanosoma equiperdum* and is the only known disease of trypanosomian origin that occurs in Canada. Natural dourine is very rarely, if ever, observed in an acute form. Starting from an infective coitus, at some point in the genital organs the disease takes an irregular and uncertain course but is essentially chronic and intermittent. Determining factors in its evolution are (1) the degree of virulence of the trypanosome strain, (2) the degree of resistance or of susceptibility of different breeds of horses, and (3) physical and functional conditions and disturbances dependent upon climate and seasonal changes, breeding, exhausting work, and stabling or living a natural life on the open ranges or pastures. As to virulence, Laveran and Mesnil have well stated that "the trypanosome of dourine constitutes one of the best examples of variations in the virulence of the same species following its origin and genealogy." The higher breeds of horses show the greater susceptibility. In the thoroughbred the disease is apt to make quick progress and manifest itself mainly in derangements of the central nervous system. In the heavier and sluggish breeds, such as the "Clydesdale," the disease is more halting and is marked mainly by oedemas and disturbances of the circulatory system. Native pony breeds are the most resistant and frequently serve as carriers and reservoirs of the virus for a duration of years. Donkeys are also well able to tolerate infection and to become dangerous carriers. Climatic changes and extremes of temperature may cause either an arrest or an advance in the progress of the disease, cold retarding and heat favouring it. Thus, in Canada it often lies dormant through the winter months, becoming suddenly and increasingly active during the first hot spell of weather in June or July. Under natural conditions on the open range or at pasture more resistance is shown to it than in stable-kept animals. Breeding, heavy work and physical exhaustion favour the disease, especially in the stallion. Mares that have become impregnated at the time of the infective coitus occasionally abort, but more often they carry their young to full term. It has been noted again and again that pregnant infected mares have remained apparently healthy up to the time of parturition and that shortly after and about the time of the first oestrum have changed to a state of obvious disease and rapid breakdown in which marked symptoms of dourine were presented. In short, while all horses are more or less susceptible to dourine, the disease itself, like most chronic infections, is susceptive to various modifications and interruptions.

Infection.—Although infection is passed from the diseased to the healthy during the act of copulation, and in that manner alone, it does not follow that transmission is always effected at such time of contact. A stallion, for example, may infect all the mares he covers during one week and none during the next. The contact of two mucous surfaces, the diseased and the healthy, provided the dourine parasite is present at the time, is the only necessary condition for transmission. The trypanosome is quite capable of passing through an intact and mucous membrane and no wound or abrasion is needed for the virus to gain an entry to the tissues. But there are periods in the course of the disease when the parasite is absent from the genital mucosa and lies dormant in the tissues. These may be called "non-infective" periods and may have a duration of weeks or of months; they are most apt to occur in the later stages and, consequently, animals in the earlier stages of infection are usually the most active propagators, while those which enjoy a temporary or partial immunity become the carriers.

Period of Incubation.—The interval from the time of the infective coitus to the first appearance of symptoms or of visible changes varies and averages between two weeks and three months. It may be even longer and sometimes it happens that no symptoms can be recognized until the first winter has passed and the second spring or summer arrives. From an immunological viewpoint and as a period of sensitization, the incubation interval is less than one month, for specific serum reactions can be obtained within that time and usually in from ten to twenty days after infection.

Evolution of the Disease.—Commencing as a local infection dourine habitually takes a chronic, intermittent and irregular course both in its local and general evolution. With trypanosome strains of low virulence and in animals of strong resistance the infection may be arrested locally and held in check for an indefinite period and, in some cases appears to terminate there. In other cases, and such are in the majority, infection is both local and general, that is to say, it predominates locally, in the genital organs, throughout the course of the disease but, from time to time, finds its way to distant organs and tissues. In a third type of case the opposite holds good, that is, the genital organs acquire a partial or temporary immunity while the disease is progressing in other directions, and especially in its attack upon the central nervous system.

In most accounts of dourine the evolution of the disease is divided into three well-defined periods or stages to which certain symptoms are ascribed, thus: (1) *Primary*—oedema, tumefactions and changes in the genital organs; (2) *Secondary*—plaques and skin eruptions; (3) *Tertiary*—paralyses, anaemia and cachexia. This arrangement is convenient for descriptive purposes but is arbitrary and rather apt to mislead an inexperienced observer of the disease in his conclusions or diagnosis based upon the clinical history and evidence. Actually, the disease operates in a succession of attacks, each attack being followed by a period of tolerance or temporary immunity of very uncertain duration. One attack may follow another so closely that symptoms overlap or are never altogether absent. On the other hand, the attacks may be so far apart that in the long intervals between them there is no visible sign of the disease. Unless such an interval has continued for at least two years without any relapse it would be hazardous to assume that the animal had permanently recovered. As for the grouping and sequence of symptoms it should be remembered that symptoms of all three groups may be coexistant; or, that symptoms of one group may appear simultaneously with those of another, and that "primary" symptoms, or those categorized as such, may reappear after the first, second, third or any later attack, and, similarly, that those of the "secondary" or "tertiary" groups may recur repeatedly and irrespectively of the order or sequence indicated.

In short, the disease is marked by stages of exacerbation, tolerance and relapse, any of which may be of short or of long duration. They may occur but once or may be repeated over and over again before the final stage either of recovery or of decline. The symptoms most frequently noted are fever, tumefactions and local oedemas of the genital parts and mammary glands, oedematous eruptions of the skin, knuckling of joints, and inco-ordinate movement, especially in the hind limbs, facial paralyses, ocular lesions, anaemia and emaciation. The one true pathognomic symptom is the oedematous patch or "plaque"; but, unfortunately, it is a rare symptom and can only be observed in a comparatively few cases. In the earlier stages of infection fugitive oedemas of the genital organs and paroxysms of fever are the rule, thus:—

In a stallion the first symptom is a slight oedema of the sheath, often accompanied by a slight swelling of the glans penis. The mucous membrane at the urethral exit may show a bulging, infiltrated appearance and may even protrude from the opening. These first oedemas tend to disappear within a few days. After an interval, usually fifteen to twenty days, the oedema returns and is apt to be more pronounced. It may involve a portion of the scrotum and fluctuates as a cold and painless swelling. As a rule there are well marked stages of augmentation and diminution with varying intervals between. The oedema advances in a succession of waves and during each recess an increasing extent of permanently thickened and indurated tissues can be noted. The penis may be in a state of paraphymosis, temporary or more or less permanent. In stallions of the heavy sluggish breeds the oedema may extend over the whole of the floor of the abdomen and reach along the chest wall to the brisket, dominating the clinical picture throughout the disease. In the lighter breeds, and especially in the more active and highly-strung running horses, this symptom may be slight and quite transient.

In a mare the first symptom is a patch of slightly swollen mucous membrane of the vulva or vagina and is closely followed by tumefactions of the vulva. Sometimes only one labium is involved, giving a distorted appearance to the vulva. The oedema vanishes and returns, the intervals becoming more and more irregular. The outer black skin of the vulva, and sometimes of the anus, may show irregular shaped patches of depigmentation. The patches usually extend outwards from the inner borders of the labia, at first appearing pink and then becoming white. They are of uncertain duration; in some cases they persist or remain as permanent leucodermic patches, in others they return to a normal appearance within six months to one year. At this stage the vaginal mucosa may show raised and thickened, semi-transparent patches of a glassy or straw-coloured appearance or somewhat mottled. Folds of swollen membrane may protrude into the vulva opening; the clitoris is often swollen and erect. Frequently there are spasmodic attempts to urinate, prolonged periods of oestrum and increased sexual desires. At such times there is an excess of vaginal mucous mixed with a serous exudate and occasionally tinged with blood. In the later stages of disease, and especially when an infected pregnant mare has aborted or foaled, there may be a chronic vesico-uterine discharge. In some mares the genital symptoms may be so slight as to escape observation. After infection has existed for six months or longer, and when it may be impossible to detect any abnormal condition of the vagina or vulva, it is not uncommon to find a slight oedema of the udder or of the skin and underlying tissues just anterior to the udder. Less commonly there may be noted an oedema about the anus, or one or more patches between the vulva and the udder, or upon the inner surfaces of the thighs. Such symptoms, slight and vague as they may seem to be, are important, for it is in these serosities that the trypanosomes of dourine are most likely to be found by patient searching.

The true *"plaque,"* or "dollar spot," differs somewhat in appearance from the oedematous patches already mentioned. The "plaque" has been aptly described as a thin disc of metal slipped under the skin. As such it may appear upon any part of the body surface, but seems to favour the sides covering the ribs. In Canada this characteristic symptom of dourine can rarely be observed. In many animals held under continuous veterinary observation, and in which this symptom was especially watched for month after month, in winter and in summer, a plaque was never known to have occurred. Others have exhibited plaques in the first, second and in the third years of the disease. In the most of cases the plaque has occurred singly and at wide intervals of time; less often, two, or even three, plaques were observed at the one time; and, in some rare cases, a rapid succession or "crop" of plaques during one brief period in the course of the disease. The average duration of a single plaque is four to five days. Rarely does the eruption and absorption of the swelling occupy less than three days or more than ten days. The average size is one and a half to two inches in diameter, and one-half inch in thickness or elevation. The site of a plaque, especially in animals with a smooth and glossy coat, is often made conspicuous by the staring or bristling appearance of the hair at that point. During the eruptive stage of the swelling and in the serous fluid the trypanosome of dourine can always be found.

Fever, distinctly of the intermittent or remittent type, may occur during any stage of the disease. It is more regular and pronounced during the early stages and before any marked tolerance or immunity has been acquired. A typical paroxysm has an average duration of five to six days, the maximum temperature, usually 104 to 105° F., being reached about the third or fourth day. The intermission ranges between twenty-one and twenty-eight days. These febrile paroxysms are closely associated with trypanosome cycles of development. A renewal of genital symptoms, the eruption of plaques, or a recurrence of oedema on some part of the animal body can usually be detected during or just preceding the rise in temperature. As the disease advances the febrile conditions become more variable and inconstant. In the later stages a subfebrile temperature of about 102° F. may continue for weeks or months. Very little depression or constitutional disturbance accompanies the fever, even during the severer paroxysms, and the appetite is maintained throughout.

The nervous system is subject to severe disorders and disturbance, indicated by inco-ordinate locomotory action and paraplegic conditions affecting the hind limbs, lips, nostrils, ear and throat. The animal shows a wabbling gait and sways from side to side. There is knuckling over at the fetlock joints, and, in unshod animals, the toes of the hind hoofs wear down from dragging and shuffling the feet. The animal is prone to trip over small obstacles and there is frequently a spasmodic contraction and relaxation of the muscles of the hind legs. Facial paralysis is nearly always unilateral. The ear, upper eyelid, nostril and underlip of one side of the head may be affected at the same time or only one of these appendages. The nervous symptoms are not as fugitive in character as the symptoms of the other groups. They tend to persist or to become aggravated independently of other symptoms, and, as a rule, are the more pronounced in the absence of other symptoms.

Ocular symptoms are not constant and occur in only a small percentage of cases. They comprise photophobia, lachrymation, keratitis, corneal opacities and changes in the interior of the eye. Stallions seem more prone to ocular troubles than do mares. It is of interest to note that on more than one occasion a corneal opacity was the first symptom observed in animals that came under suspicion of dourine infection.

The duration of the disease averages between one and two years. Rarely is it under six months; sometimes it extends to three years and occasionally to five years. As a rule, if an animal survives the third year of infection a permanent recovery of health follows. In such cases specific infection and immunity reactions are obtained with the complement-fixation test for an indefinite period and even up to 10 years.

Termination and Mortality.—In cases advancing towards a fatal termination the decline is usually slow and gradual. The appetite remains good almost to the end and often appears excessive. There is a progressive anaemia and emaciation; the animal has a most dejected appearance and continues a miserable existence until finally, from exhaustion and paraplegia, it is down and unable to rise, and, unless destroyed, suffers a lingering death.

In stallions the disease would appear to be fatal without exception; but in mares the evolution of the disease is slower and more irregular and uncertain in its result. Certainly, a large number of mares would make a natural recovery. The mortality depends upon the factors of virulence of the pathogenic agent and upon the resistance of the breed of animal infected. In the prairie-bred, native animal, the mortality is low; in pure-bred, imported animals it is high. Among the naturally infected animals, representative of different types and breeds, at the dourine research station, the mortality has not exceeded 50 per cent.

Pathological Anatomy.—The end stages of dourine are usually marked by a progressive emaciation and anaemia and in many cases, and more particularly in stallions, by oedematous swellings extending along the lower surfaces of the body. The oedema is sometimes of enormous extent and the swollen tissues in the region of the scrotum and under the abdomen may be up to eight inches and more in thickness.

At the autopsy one finds more or less gelatinous exudation under the skin. In the stallion the scrotum, sheath and testicular coverings are thickened and infiltrated; and in some cases the testicles are embedded in a tough mass of new sclerotic tissue in which they are scarcely recognizable. In the mare the vulva, vaginal mucosa, uterus, bladder and mammary glands may show thickening and gelatinous infiltration. The lymphatic glands, particularly the abdominal, are hypertrophied and softened and sometimes hæmorrhagic.

Further changes similar in character to those found in other chronic, wasting disease and anaemia may be noted, viz., gelatinous infiltration, serous transudation from the pleura, peritoneum and pericardium, and fibrinous deposits, adhesions and new growth on the liver, spleen, diaphragm and thoracic organs. Cystitis, pyelitis, nephritis, and bone marrow changes may also be noted. The spleen is not enlarged and may be under weight. The liver may be engorged with blood.

The principal changes are to be found in the nervous system, and are most marked in the lumbar and sacral regions of the spinal cord. In animals in which paralytic conditions in the hind limbs have been severe and of long duration the cord shows softened, pulpy and discoloured areas. Histological examination shows a degeneration of the nerve fibres of the posterior columns, and a cellular infiltration, degeneration and atrophy in the extraspinal nerve trunks, particularly of the hind limbs. In accordance with these findings Marek names the disease *Polyneuritis infectiosa.*

APPENDIX No. 1.

DIAGNOSIS.

Symptomatic diagnosis.—The type of oedema affecting the genital organs, the eruption of the characteristic "plaque" and the peculiar nervous symptoms and inco-ordinate locomotion in connection with the hind limbs may suffice for a diagnosis. But in the early stages of the disease and in latent cases it is difficult or impossible to detect any such symptoms or to recognize them with any certainty. The history of the case or cases suspected and the examination of the contact animals is important and not to be overlooked. Where it may be impossible to come to a conclusion in the case of a single animal, the symptoms presented in a group of animals may clear away all doubt. If it is found that only stallions and brood mares are affected there are but two covering diseases to consider, namely, dourine and coital exanthema. The latter is the disease most commonly confused with dourine owing to a misconception of the relative importance of ulcers and depigmented spots in these diseases. In coital exanthema the ulcers, preceded by vesicles and followed frequently by depigmented spots are characteristic lesions and the basis of a symptomatic diagnosis; in dourine they are not and have very little importance. It has been said and repeated in many descriptions of these diseases that the depigmentation in the former is transient and in the latter permanent. I have found the opposite conditions to prevail. With regard to ulceration of the genital organs in horses it is extremely doubtful if such lesions ever occur as a direct result of dourine or any other trypanosome infection. I have never observed an ulcer in any case of experimental infection in horses. Ulcers have occasionally been noted in naturally infected mares, usually in aged animals, and in stallions, and also in normal mares and stallions. In appearance the lesions are quite similar in the dourined and in the healthy animals. In mares they are usually situated near the edges of the vulva and in stallions on the inverted portion of the penile sheath. Microscopical examination of deep scrapings frequently show spirochaetae infection.

Detection of the parasite.—In the naturally infected animal the trypanosome appears and multiplies in the serosities of local oedemas. It is futile to search for it in the blood. As soon as a plaque is signalled or an oedematous patch in the region of the vulva, anus or mammary gland is noted, the search should commence. The skin over the patch should be washed, shaved and dried. Two or three punctures are then made with a fine needle and if a clear or only faintly tinged serum exudes on pressure wet cover-glass preparations and stained smears are examined. A very long and thorough search should be made before pronouncing a negative result. Sometimes there are one or several trypanosomes present in each microscopic field but this is a rare finding. Sometimes only one or two organisms are to be found in the whole of the specimen examined. The object in puncturing the swelling with a fine needle is to avoid the blood vessels; the more the serous fluid becomes diluted with blood the less the chance of detecting the trypanosome. As a rule the parasites are present in the serous contents of the oedema only for a few days though the swelling itself may persist for several days after parasites have disappeared from it. It may accordingly be necessary to examine a number of oedemas before the parasite can be detected.

In searching for the parasite in the vaginal tract the most oedematous looking patch of mucous membrane is slightly scarified and specimens of the exuding fluids are prepared for examination. A previous irrigation of the vagina with warm salt solution secures fresher specimens, richer in trypanosomes and facilitates the search.

The trypanosome is very rarely to be found in the massive oedema that spreads along the under surface of the abdomen nor in the oedema of the scrotum.

In horses the parasites are always few in numbers and for long periods in the disease lie inactive so that detection is usually a very difficult matter, and diagnosis by microscopical examination is possible only in rare cases.

Serum diagnosis.—The serum of dourine infected animals possesses certain specific properties which can be determined by (1) the complement-fixation test, (2) the agglutination test, and (3) the precipitin test. Of these, the first named is recognized as a delicate, safe and satisfactory method of diagnosis. The full technique and description is given further on (Appendix No. 2) together with some observations on the incubation period and longevity of dourine indicated by the serum reaction in the complement fixation test.

The agglutination and precipitin tests[1, 2] are useful aids to diagnosis but less satisfactory than the complement fixation method especially when large numbers of animals are involved.

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[1] Winkler & Wyschelessky, *Berlin, Tierarztl, Woch., Dec. 21, 1911.*

[2] Watson, *Proc. Amer. Vet. Med. Assoc., 1912.*

APPENDIX No. 2.

DOURINE AND THE COMPLEMENT-FIXATION TEST.

The full description and detailed technique of the complement-fixation test method of diagnosis was published in 1915 in "Parasitology," and is reprinted in this appendix.

Among the animals experimentally and naturally infected with dourine are some which have survived the whole period of these investigations, 1905 to 1920, some which showed tolerance and relative immunity for many years, some which succumbed to the disease and some which died from other causes (charts I, II and III). The sera of many of these animals were used as controls in the 40,000 serum tests made during the period 1912 to 1919, the records of these re-actions furnishing some remarkable data, summarized below in table No. I.

All the animals there listed (table No. I) excepting the last two, Nos. 180 and 182, were infected five to seven years before the complement-fixation test was available, so that the reactions for that period cannot be given. However, Nos. 180 and 182 were tested at intervals of a few weeks from the first to the fourth and fifth years and constantly gave positive reactions. Further, all other horses which succumbed to dourine in from one to five years, not included in this table but which were serum-tested at frequent intervals, gave constant positive reactions up to the time of death.

Normal horses and horses in different stages of swamp-fever infection, used year after year as "negative controls," never gave a positive reaction.

It may therefore be concluded that in dourine a positive reaction to the complement-fixation test is given in all cases up to the time of death from the disease, and up to the fifth year after infection in cases that recover, and continued in some such cases up to the seventh, ninth, eleventh and thirteenth year.

In experimental dourine of the horse and donkey the incubation period is determined by the complement-fixation test as ten to eleven days (table No. II).

TABLE No. I.—Showing the serum reaction (to dourine) in the Complement-fixation test for a number of years after infection.

Horse No.	Complement-fixation Test.	
	Positive.	Negative.
2 (Chart No. I)	9th and 10th year	
10 (" " I)		9th year onwards.
13 (" " I)	5th to 11th year	
17 (" " I)	5th and 6th year	
24 (" " I)		8th year onwards.
29 (" " II)	7th to 13th year	
7f (" " II)		6th year onwards
26 (" " III)		9th " "
48 (" " III)		6th " "
52 (" " III)		7th " "
66 (" " III)	7th year	
67 (" " III)		7th year onwards
69 (" " III)		7th " "
70 (" " III)		7th " "
71 (" " III)		7th " "
75 (" " III)	7th and 8th year	
82 (" " III)	9th and 10th year	
180 (" " III)	1st to 4th year	
182 (" " III)	1st to 5th year	

TABLE No. II.—Showing the incubation period of dourine as determined by the Complement-fixation Test.

Horse No.			
190	(Table No. III)	1st positive reaction,	11th day after inoculation.
130	(" No. III)	" "	10th " "
Donkey			
183	(Table No. III)	" "	10th " "

DOURINE AND THE COMPLEMENT-FIXATION TEST.

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Introduction.

This paper is written with the purpose of drawing further attention to the value of the complement-fixation reaction as a diagnostic test in dourine and of recommending a method of procedure and technique arrived at with an experience of 15,000 tests for dourine made at the Veterinary Research Laboratory, Lethbridge.

In a previous paper I have briefly described the serum reactions in dourine. Since that paper was published in 1912 (*Proceedings of the Amer. Vet.-Med. Assoc.*) diagnostic tests for dourine have been carried along continuously at this laboratory, together with exhaustive control and experimental tests and the searching out of every possible source of error. By the numbers of horses available for experiment, the prolonged trial of the test through every known phase of the disease and its widest application in naturally occurring outbreaks, coupled with observations in company with the veterinary officers in charge of the field work, the complement-fixation reaction has been thoroughly established as a sure, safe and specific method of diagnosing dourine. The experience shows that the test meets every requirement with regard to specificity, uniformity and decisiveness. It has been adopted as the official test for dourine in this country by Dr. F. Torrance, Veterinary Director General for Canada, who kindly permits me to publish this paper.

By the complement-fixation test it has been possible—and without difficulty—not only to make a certain diagnosis of the more or less symptomatic cases, but, and of greater importance, to positively determine the existence of the non-clinical, obscure and latent forms of infection.

Only by a systematic application of the test to every animal exposed to infection —and in no other way known at present—can the healthy-looking, so-called immune carriers of dourine be detected. When it is remembered that horses may tolerate a dourine infection for periods of one to three years and remain for that time normal in general health and appearance but capable at times of transmitting the disease, the necessity of an early and definite diagnosis is evident. The complement-fixation test furnishes this and thus becomes of great importance as a basis for the control and suppression of dourine. It is being applied in every known outbreak of dourine in Canada, and, as a precautionary measure, in the various studs and to stallions standing for service in the districts that have come to be considered as dourine-infected areas.

Brief Explanation.

The general principles and mechanism of the complement-fixation reaction are now so widelly known that it seems unnecessary for the purposes of this paper to repeat them in detail, a few remarks on the subject sufficing to make it clear and intelligible.

When an antigen is introduced into an animal either by way of natural infection or by artificial administration a group of reaction products arise in the animal's serum—known as antibodies—bearing a specific relationship to the antigen and able to combine with it outside of the animal body under certain conditions. Micro-organisms, foreign blood cells and sera, albumens and many forms of protein matter are able to act as antigens. Thus an animal infected with dourine produces antibodies resulting from and specifically related to the dourine antigen, namely *Trypanosoma equiperdum,* the actual cause of the disease.

In a similar manner, an animal which has received injections of the blood of another animal species becomes possessed of antibodies having a specific affinity for the blood of that particular species of animal. In other words, the antibody arising in response to the exciting antigen in the process of infection, sensitization, or immunization, has the specific function of acting upon the antigen to neutralize it or prepare it for destruction.

The complement-fixation test applied in the diagnosis of disease consists of two sets of antigen and antibody, that is, two distinct and separable combining groups having no relationship to one another but in each of which *Complement*—a constituent of normal serum—is an essential factor. It is convenient to distinguish these groups by referring to the one comprising haemolytic serum, red cells and complement as the "hæmolytic system" and to the other—closely related to the disease—comprising dourine, antibody corresponding antigen, and complement as the "antibody-combining group." Thus:—

Haemolytic serum ⎫
Red cells ⎬ *Haemolytic system*
Dourine or antibody ⎧ —COMPLEMENT— ⎭
combining group ⎨ Antigen
⎩ Antibody

Before the test can actually be applied the exact dosage of the different elements in each group must be worked out by careful quantitative titrations—the most important step in the whole proceeding—and the operator must be absolutely assured that each group reaction is under his perfect control and that the least disturbing factor will be known to him. In the actual test only one complement unit is employed (the minimal amount necessary for the completion of the haemolytic system) so that only one of the reaction groups can come into operation; it is according to whether the complement unit is attracted and affixed to the antibody-combining group or to the haemolytic group that we obtain a positive or a negative reaction. The former will always be effected when the antigen and antibody correspond, that is, when the serum tested contains the specific reaction products of dourine infection even though in minutest quantity, so delicate is the reaction. Neither the antigen alone nor the serum alone, when properly prepared, can take up the complement unit; to do so, all three factors must be brought into intimate contact, and when the test serum does not contain specific dourine antibodies the complement is not fixed to this group, but remains free to join with and complete the two factors of the haemolytic system, so that the red cells undergo haemolysis and a negative reaction is indicated.

TECHNIQUE AND PROCEDURE RECOMMENDED.

Apparatus required.—Heavy glass tubes without lip, 5 inches by $\frac{5}{8}$ of an inch, and racks to hold twenty-four tubes in a double row, one above the other. Small test tubes, 4 inches by $\frac{3}{8}$ of an inch, for serum inactivation. Finely graduated measuring pipettes of 0·1, 1·0, 5·0 and 10·0 c.c. capacities. Graduated cylinders of 50 and 100 c.c. capacities. Erlenmeyer flasks of heavy glass, standard sizes up to 500 c.c. capacity. Large centrifuge cups and small centrifuge tubes. Ampoules and vials. A high power centrifuge machine, large water bath, and incubator room.

All glassware is sterilized by dry heat.

Diluting, washing and preserving fluids.

(1) Normal salt solution—0·85 per cent pure sodium chloride in freshly distilled water. A large quantity should be made up (5000 c.c.) and sterilized in flasks having a siphon attachment.

(2) Citrated salt solution:

Normal salt solution	100·0
Sodium citrate	1·5

(3) Preserving fluid for trypanosomes:

Normal salt solution	90·0
Pure neutral glycerine	10·0
Formalin (Scherings)	0·1

(4) Preserving fluid for serum:

Glycerine	95·0
Phenol	5·0

I. PREPARATION OF REAGENTS.

A. *The Haemolytic System.*

(*a*) *Red Cells.*—A quiet sheep may be bled in the standing position, otherwise it should be placed upon its back in a V-shaped trough and held there by the attendant, an assistant shaving the neck and preparing the site of operation. The operator draws from the jugular vein, under aseptic conditions, 50 c.c. (more or less) of blood into a flask containing glass beads and in which the blood is defibrinated. It is then run through a double layer of fine, sterilized gauze into large centrifuge cups, about 20 c.c. of blood in each, adding three to four times the amount of salt solution. The corpuscles are thrown down by centrifugal force, the upper fluid taken away and replaced with fresh salt solution, and the mixture again centrifuged. Washing in this way is repeated three times, when the red cells are carefully measured and suspended in an equal amount of salt solution, this 50 per cent stock suspension being stored in the ice chamber until needed.

(*b*) *Haemolytic Serum.*—Rabbits have a variable amount of natural haemolytic amboceptor for sheep's corpuscles—0·1 c.c. of fresh rabbit serum will usually haemolyze a like amount of 5 per cent corpuscle suspension. For test purposes a serum with a much higher haemolytic index is required and to obtain this rabbits are hypersensitized or immunized by repeated injection of sheep's corpuscles until a serum is given showing a haemolytic index of 0·0005.

Not less than six large healthy rabbits should be selected for the immunization, for one or several are apt to die from shock during the process. The rabbits are injected intraperitoneally with a first dose of 2·5 c.c. of the 50 per cent stock suspension of sheep's corpuscles. Every four to five days a further injection is given, each time increasing the dose until, after five or six injections, it has reached 10 c.c. This dose is repeated once or twice. After the sixth or seventh injection 5·0 c.c. of blood is drawn from the heart of each rabbit, using a hypodermic syringe and a fine needle. The operation can easily be performed and does no harm to the animal.

The serum of each rabbit is then heated for one-half hour at 56° C. and the haemolytic index established by titration (*vide* p. 22). It will be found, probably, that in only two or three rabbits out of six can the haemolytic index be raised to the desired degree, namely, 0·0005 or better. From such rabbits as much blood is drawn from the heart as will not endanger the life of the animal—about 25 c.c. The rabbits are then kept in reserve and can easily be reimmunized as required.

Finally, the serum is separated from the corpuscles and stored in very small ampoules—0·2 c.c. in each ampoule for convenience and economy—in the ice chamber.

When the serum is not to be used immediately it requires neither inactivation nor carbolization, and is, in fact, better without, the index remaining constant or but very slightly lowered even after six months. But unless the serum has been collected under aseptic conditions, rather than risk it spoiling, 1·0 c.c. of the carbolized glycerine preservative is added to 9·0 c.c. of serum before measuring it into the ampoules.

The whole procedure of immunizing rabbits, drawing blood from the heart, separating and bottling serum, can and should be carried out under aseptic conditions.

(*c*) *Complement.*—Normal guinea-pig serum in a fresh state furnishes a rich complement. Blood may be drawn from the heart, if desired, but as guinea-pigs are usually plentiful at a laboratory it is simpler to anaesthetize the animal in an ether jar, remove and suspend the guinea-pig over a centrifuge tube of 25 or 30 c.c. capacity, sever the arteries and veins on one side of the neck, and collect all the blood.

Centrifuge immediately, before coagulation takes place. The clear serum is taken off and placed in the ice chamber. Complement is always better used in the fresh state so the guinea-pig should not be bled until just before complement is needed for a titration or a diagnostic test.

B. *Dourine (antibody) combining group.*

(*x*) *Antigen.*—A stock dourine antigen is obtained as the result of inoculating a number of white rats with *Trypanosoma equiperdum,* collecting the rat's blood when teeming with trypanosomes, and separating the trypanosomes from blood cells and serum by washing and centrifuging.

The blood of a dourine infected rat is collected in a vessel containing sufficient salt solution to prevent coagulation. Not less than ten large white rats—twenty or twenty-five rats, if a considerable amount of antigen is needed—are inoculated intraperitoneally with the diluted blood, injecting an equal amount, about 0·3 c.c., into each rat. This may be done very conveniently by taking a small sharp-pointed pipette, with rubber tubing and mouthpiece attached, drawing the blood up to a point marked by a file or pencil, and expelling it into the abdomen, repeating the process with the same pipette for each rat. The object is to have all the rats come down together with a heavy infection. In the ordinary course a white rat dies of dourine between the end of the third and the beginning of the fifth day of infection. When twenty-five rats are inoculated at the same time about fifteen of them show a heavy trypanosome infection at the end of the third day, the remainder within the next 12-24 hours. It is necessary to make a rapid cover-glass examination of the blood of each rat forty-eight hours or so after inoculation and to sort the animals according as they show a light or a heavy infection into two or more groups. The result of the first blood examination will indicate approximately the time for a second examination and upon that the hour for bleeding may be judged. The timing of this operation is important for in the last six or eight hours of infection the trypanosomes multiply enormously, and if the rats are left until well on into this stage a very rich antigen will be furnished. Careful timing, however, is necessary, for it may easily happen that eight or ten rats will all die within one to two hours, if left too long. The bleeding should be carried out as rapidly as possible. The writer's method is simple and effective and may be worth describing in detail:

A running noose is made out of a two-foot length of thin copper wire, doubled over in the middle and twisted to the ends, the ends being passed through the ring formed at the beginning of the twist to form the noose and attached to any convenient fixture over a laboratory wash basin, six inches above an operating board resting across the basin. An ether jar, a flask of citrated salt solution, two sterile covered beakers and a razor complete the outfit.

An assistant passes the rats one at a time into the ether jar and hands them over as required. The animal is held back downwards in the left hand of the operator whose index or middle finger presses on the left front limb of the rat. The noose is slipped over the head and arranged so that the pull stretches the left side of the neck bending the head slightly to the opposite side, backwards and downwards. A beaker half filled with citrated salt solution is placed in position under the neck, the arteries and veins on that side and close to the shoulder then severed with a single sweep of the razor. Usually, the animals bleed better if one avoids severing the trachea. In this way ten rats may be bled in half-an-hour. The volume of blood and citrated salt solution should be about equal or a slight excess of the latter. The mixture is then passed through a double layer of sterile gauze to remove any small clots and fibrin into narrow centrifuge tubes, 10 mm. diameter and 10 c.c capacity (when wider tubes are used it is more difficult to separate the trypanosomes and the wastage is greater). Centrifuge not longer than four to five minutes at 1,500 revolutions per minute so that the bulk of the corpuscles are thrown down while the trypanosomes remain in suspension. Draw off the cloudy suspension fluid into fresh tubes, then the upper layer of corpuscles—more or less mixed with trypanosomes—into another tube, and the next layer into a second tube, adding citrated salt solution and again centrifuging for 8-10 minutes. Draw off and discard as much of the upper fluid as appears clear and free from trypanosomes. Then collect from each tube into a single tube the upper pure white layer of trypanosomes, in another tube the middle layers slightly soiled with blood, and in a third and fourth tube the lower layers in contact with the blood cells. Add normal salt solution now, not citrate, shake up well and centrifuge again, repeating the washings until all the trypanosomes are obtained in a pure white mass.

Ten rats bled at the right time will furnish 5·0 c.c. of trypanosomes. Twice the volume of the glycerine-formalin preservative is added and the mixture stored in sealed amber ampoules, 1·0 c.c. in each, in a block of ice.

5·0 c.c. of trypanosomes will make 100 c.c. of antigen, sufficient for more than 500 diagnostic tests. The antigen will keep indefinitely if solidified by freezing, and for 6–8 weeks or longer when stored in liquid form, in sealed ampoules, on ice.

(*y*) *Antibody.*—In the diagnostic tests the antibody, of course, is or is not present in the suspected serum. But for purposes of control and titration and to thoroughly understand the combining action of dourine antigen and antibody it is absolutely necessary to have one or more series of known positive or specific dourine horse sera, of which the antibody content can be determined. To obtain this a horse is inoculated with *Trypanosoma equiperdum*. Ten days later and at weekly intervals thereafter, blood is drawn aseptically from the jugular vein, the serum collected and tested for antibody content (*vide* p. 28). A series of specific positive sera are thus obtained, representative of different periods and stages of the disease. Stored in the ice chamber the sera will retain their specific properties for many months, even years, if collected sterile. If not absolutely sterile the serum may be preserved by adding 1·0 c.c. of 5 per cent carbolized glycerine, or the same amount of iodized glycerine to 9·0 c.c. serum. At the same time one should collect and store a number of negative control sera under the same conditions.

II. TITRATION OF REAGENTS.

(1) *Titration of Haemolytic Serum (Amboceptor).*

Prepare the following stock dilutions of serum and corpuscle suspension:—

1. Haemolytic serum (rabbit anti-sheep)	0·1 cc.	
Normal salt solution (0·85 per cent)	9·9 “	
	10·0 “	....1 : 100
2. Complement:		
Fresh guinea-pig's serum	1·0 “	
Normal salt solution	19·0 “	
	20·0 “	....1 : 20
3. Corpuscle suspension:		
Washed sheep's corpuscles (50 per cent stock suspension	2·0 “	
Salt solution	23·0 “	
	25·0 “	....1 : 25

Further dilutions of the haemolytic serum are made as under:—

	Salt solution c.c.	Haemolytic serum c.c.			
Tube No. 1	3·0	1·0 (1 : 100)	equals	1 : 400	(0·0025 serum in 1·0 c.c.)
“ 2	5·0	1·0 “	“	1 : 600	(0·0016 “ “)
“ 3	7·0	1·0 “	“	1 : 800	(0·0012 “ “)
“ 4	9·0	1·0 “	“	1 : 1000	(0·001 “ “)
“ 5	0·5	1·0 (1 : 1000)	“	1 : 1500	(0·00066 “ “)
“ 6	1·0	1·0 “	“	1 : 2000	(0·0005 “ “)
“ 7	2·0	1·0 “	“	1 : 3000	(0·00033 “ “)
“ 8	3·0	1·0 “	“	1 : 4000	(0·00025 “ “)
“ 9	4·0	1·0 “	“	1 : 5000	(0·0002 “ “)

In each tube 1·0 c.c. only of the dilution is held back, the excess amount being discarded, 1·0 c.c. each complement and red cell suspension added, which with 2·0 c.c. salt solution make a total volume of 5·0 c.c. in each tube.

The complete titration set is then:—

	Serum dilutions (as above)	Salt solution	Complement 1 : 20	Red Cell suspension	
	c.c.	c.c.	c.c.	c.c.	
Tubes 1–9	1·0	2·0	1·0	1·0	Titration set
Tube No. 10	1·0	3·0	—	1·0	Serum control (1 : 100 dil.)
“ No. 11	—	3·0	1·0	1·0	Complement control
“ No. 12	—	4·0	—	1·0	Red cell control

Mix well and incubate for two hours at 37° C.

The control set, tubes 10, 11, and 12, must not show any trace of haemolysis.

The *titre* of the haemolytic serum is indicated by the amount present in the *last* tube of the series 1–9 in which dissolution of all the red cells is *complete,* that is, the least amount necessary to dissolve a definite amount of red cells.

For example, if in tubes Nos. 1–6 haemolysis is complete, not quite complete in tube No. 7, and still less in Nos. 8 and 9, then the titre is the amount of serum in tube No. 6, or 1·0 c.c. of a 1:2000 dilution, 1 unit being expressed at 0·0005.

A serum with a unit value of between 0·0002–0·0005 is quite satisfactory, but when the value of a single unit exceeds the latter amount the results are not so good.

The relationship and combined action of haemolytic amboceptor and complement should be clearly understood. To do this a number of experimental tests should be undertaken, using in one series only one unit of amboceptor with fractional amounts of complement, in another series two units of amboceptor and lesser complement fractions, four units and so forth, progressively multiplying the number of amboceptor units while further reducing the fractions of complement. It will be found, for instance, that two units of amboceptor require a lesser amount of complement than one unit to completely haemolyse a standard amount of red cells. The lesser the amount of complement that can be safely employed in the practical tests the more delicate becomes the fixation reaction, the equilibrium of the haemolytic system being more easily upset, even by a test serum naturally weak in antibody content and which, if a relatively large complement unit was employed, might be insufficient to give a complete reaction. On the other hand the reduction of complement must not be carried to such an extreme point that any slightly inhibitive property of one of the other reagents would tend to obscure it and give a false fixation.

It is essential that for all subsequent titrations and tests a standard dose of haemolytic amboceptor be fixed and rigidly adhered to. For all practical purposes the use of two units of amboceptor permit of a sufficiently fine gradation of complement, while still allowing a margin of safety. The dose is therefore fixed constantly at two units, to which complement is always titrated as in the next procedure.

(2) *Titration of Complement.*

Prepare (1) a stock dilution of guinea-pig complement and (2) a suspension of sheep's corpuscles, as in the previous titration.

Also (3), an haemolytic serum (amboceptor) dilution, so that 1·0 c.c. of the diluted serum contains two amboceptor units. For example, if the value of one unit is 0·0005, then 0·001 will be that of two units, the dilution being accordingly 1:1000.

The titration of complement is of the utmost importance and requires the greatest accuracy, as already indicated. Until one has become familiar with the technique and expert in reading the reactions the titration is best carried out in a double set, the second having one-half of the amount of each reagent used in the first set, the one serving as a check to the other.

The two sets are arranged as follows:—

Titration of Complement.

	First Set			Second Set		
	Salt solution	Complement.	Haemol. serum	Salt solution	Complement	Haemol. serum
	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.
Tube No. 1	2·0	0·3(1 : 20)	1·0	1·0	0·15 (1 : 20)	0·5
“ 2	2·0	0·4	1·0	1·0	0·2	0·5
“ 3	2·0	0·45	1·0	1·0	0·225	0·5
“ 4	2·0	0·5	1·0	1·0	0·25	0·5
“ 5	2·0	0·55	1·0	1·0	0·275	0·5
“ 6	2·0	0·6	1·0	1·0	0·3	0·5
“ 7	2·0	0·65	1·0	1·0	0·325	0·5
“ 8	2·0	0·7	1·0	1·0	0·35	0·5
“ 9	2·0	0·8	1·0	1·0	0·4	0·5
“ 10	2·0	1·0	0·5	1·0	0·5	0·25
“ 11	3·0	—	1·0	—	—	—
“ 12	3·0	1·0	—	2·0	—	—

Add 1 c.c. red cell suspension to each tube.

Add 0·5 c.c. red cell suspension to each tube.

Mix well (avoiding undue frothing).

Incubate at 38–39° C.

Agitate the mixtures again by shaking the racks after ten minutes incubation.

Read the reactions one hour later.

Tube No. 10 controls the original haemolytic titration, only one unit of amboceptor being used with an excess of complement. In this tube complete haemolysis should occur.

Tube No. 1 will show only slight or partial haemolysis; as one descends the series the reaction is seen to be increased, until, usually between Nos. 4 and 7, a tube is reached in which the reaction is absolutely complete. The first tube in the series in which *all* the red cells are completely dissolved indicates the complement titre. If this occurs in tube No. 5, for example, then 0·55 c.c. of a 1:20 dilution of complement is the titre, equivalent to 1·0 c.c. of a 2·75 per cent dilution.

For the antigen titration and final tests the complement is accordingly made up so that 1·0 c.c. of the dilution contains the amount of complement indicated by the above titration.

From now on it is optional whether one employs the relatively large amounts of reagents as given in the first set of complement titration, or the one-half amounts as in the second set. The latter is the more economical, especially when a large number of tests are being performed, and is given personal preference to by the writer as it seems to provide an even more highly sensitive test reaction than when the larger amounts are employed.

(3) *Titration of Antigen.*

Dilute 1·0 c.c. of stock trypanosome antigen with 19·0 c.c. of normal salt solution.

Prepare the complement and haemolytic serum according to their titration values already determined.

Inactivate by heating for half-an-hour at 58° C. in a water bath, 2·0 c.c. of known positive dourine horse serum and 2·0 c.c. of known negative or normal horse serum.

The antigen is then titrated in a double set, the one being with the positive serum, the other with double the amount of negative serum. Thus:—

	Positive set				Negative set			
	Salt sol.	Known *positive* horse serum	Antigen	Complement	Salt sol.	Known *negative* horse serum	Antigen	Complement
Control	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.
Tube No. 1......	1·0	0·1	0·02	0·5	1·0	0·2	0·05	0·5
" 2......	1·0	0·1	0·05	0·5	1·0	0·2	0·1	0·5
" 3......	1·0	0·1	1·01	0·5	1·0	0·2	0·2	0·5
" 4......	1·0	0·1	0·15	0·5	1·0	0·2	0·3	0·5
" 5......	1·0	0·1	0·2	0·5	1·0	0·2	0·4	0·5
" 6......	1·0	0·1	0·25	0·5	1·0	0·2	0·5	0·5
" 7......	1·0	0·1	0·3	0·5	1·0	0·2	0·6	0·5
" 8......	1·0	0·2	—	0·5	1·0	0·2	—	0·5
" 9......	1·0	—	0·25	0·5	1·0	—	0·5	0·5
" 10......	1·5	—	—	0·5	2·0	—	—	—

Mix well and incubate for one hour and ten minutes at 38-39° C.

Mix together equal quantities of haemolytic serum (amboceptor) and red cell suspension, then add 1·0 c.c. of the mixture to each tube.

Shake again and incubate for two hours longer.

It is usually possible to read the antigen titre in 1½ hours and proceed with the final tests; nevertheless, the tubes should be left or replaced in the incubator for the full two hours and then put on one side for further reference and to see if any further action has taken place.

Tube No. 10 is the control for the haemolytic system and must show complete haemolysis. No. 10 in the second set contains only haemolytic amboceptor and red cells and must not show the slightest degree of hæmolysis. No. 8 controls the horse serum, No. 9 the antigen, the red cells being haemolysed in all.

The positive set will show more or less complete fixation of complement—no haemolysis, except perhaps in the first and second tubes, the negative set complete haemolysis. When the antigen appears very strong there may be some inhibition in the negative set in the tubes containing the larger amounts of antigen.

The amount of antigen to be selected as the titre for the final tests is that which gives complete fixation with the positive serum while double the quantity in the corresponding tube of the negative set does not prevent or inhibit haemolysis.

III. The Serum to be Tested.

Collection of serum.—The chief point aimed at in collecting blood from suspected animals is sterility, especially when the specimens have to be transported over long distances and mailed to the laboratory. Absolute sterility is not essential, nevertheless as near as possible aseptic conditions are to be strongly recommended and the avoidance of adding carbolic acid or any other antiseptic fluid to the sample specimen as a preservative. The blood clot should be well formed and the serum odourless and clear or only slightly tinged with haemoglobin.

The condition of a sample of blood may vary greatly according to the size and shape of the vial or tube containing it, the slowness or rapidity with which blood is run into the vial, the partial or complete filling of the vial, the shaking of the specimen before coagulation has occurred, and in other ways irrespective of asceptic conditions and of abnormal properties of the blood itself. In square or rectangular bottles and in specimen vials without a neck the clot has a tendency to cling firmly to the sides, the serum being separated with more or less difficulty. In small round bottles, curved into a narrow neck and mouth, for corks, filled with freely flowing blood to within a margin of the narrowest diameter but not touching the cork, and allowed to stand for at least half an hour for coagulation, there is usually an abundance of clear serum.

Such bottles, of one ounce capacity, one inch in diameter, three-eighths inch neck and mouth, are very suitable for field work. They must be absolutely clean and free from any trace of soap, alkali or acid. These bottles are distributed from this laboratory after being sterilized in the hot air oven, corked, labelled and well wrapped in sterile paper wrappers. Also, large bore needles attached to three inches of rubber tubing with a small glass nozzle, separately wrapped and sterilized. With this simple apparatus and observing the usual precautions during operation it is an easy matter to draw blood from the jugular vein of a horse, aseptically.

Among the last 6,000 samples of blood secured in this manner less than twenty have reached the laboratory in a condition unfit for testing and these few unfit specimens have been ten days or more in transit.

On reaching the laboratory the specimens are briefly examined and where necessary the clots are detached from the sides of the bottles with a sterile wire. They are then left to stand in a cool chamber overnight for the serum to clear. The serum is then drawn off into small test tubes, about 2·0 c.c. in each, and is ready for inactiva-

Inactivation of serum.—Before any specimen of horse serum can be used in the complement fixation test it has first to be inactivated. All animal serum in a very fresh state contains complement in a varying amount. This constituent is readily destroyed by heating the serum to 55-56° C. for one half hour. No complement other than that employed in the haemolytic system may take part in the reaction. As a matter of fact horse complement very rapidly becomes inert and in specimens several days old is a practically negligible quantity. However, in normal horse serum there arise several other factors which, unless destroyed or rendered inactive, are able to act upon complement and antigen and disturb an haemolytic system. All untreated horse, donkey and mule sera possess enzymotic and proteolytic properties, potentially at least, and becoming active in sera a day or two old. They act upon most preparations of antigen, especially upon macerated organs, such as the liver and spleen, and are all more or less anticomplementary, more so in the presence of antigen than without it. Such action, of course, is non-specific and must be eliminated, otherwise it would be difficult or impossible to distinguish a specific from a non-specific reaction. Fortunately it can be eliminated, and the equilibrium of the serum fixed, by a proper and sufficient inactivation. *It is more resistant to heat than is complement and is not wholly destroyed at* 56° C. This is an important point, and one that appears to have been overlooked. I cannot help thinking that it is the explanation and the source of error of many of the apparent failures or discrepancies, especially that of non-specific fixation, which some serologists experience. A reference to the literature on complement-fixation methods shows a remarkable lack of uniformity in respect to the degree of heat and the length of time for the inactivation of suspected sera—fifteen to thirty minutes at degrees varying between 50 and 58° C.

A few experiments with sets of ten or twenty different horse, mule and donkey sera, each set being heated for thirty minutes at different degrees between 50 and 62 C. and then tested in the haemolytic system, with and without antigen, will show the importance and necessity of a very careful inactivation and the temperature required (*vide* p. 27).

Method of inactivation recommended.—A water bath, sufficiently large to hold 200 small test tubes, is heated to 60° C. The tubes, containing 2·0 c.c. serum in each (numbered for identification in waterproof india ink, labels being apt to become detached), are placed within the inner tank which is to contain sufficient water to mount to the level of the serum or to about half the height of the tubes. The cover of the tank should have two perforations for thermometer tubes which are inserted into control tubes within the tank, enabling the temperature to be read without removing the cover. Another thermometer passes directly into the outer tank. For the first few minutes the temperature will rapidly fall; it is brought up to 59° again —taking about ten minutes—and maintained at that point for a full half hour, for horse serum, and to 62° for one half hour for donkey or mule serum.

There is no danger of destroying the specific antibodies of dourine sera by heating to the points given. Dourine sera can, in fact, be heated up to 65°, or to the point of coagulation, and still retain an active antibody content to give the test reaction, but the anticomplementary and non-specific factors in horse sera are wholly destroyed at 59°, and in donkey and mule sera at 62°.

To control the inactivation, with each batch of suspected sera several known positive dourine sera as well as known (anticomplementary and non-specific) negative sera are included and all tested together in the final diagnostic test.

Experiment showing the degree of inactivation of suspected serum necessary for specific reactions.

Dose of serum, 0·2 c.c., unheated and heated at different degrees of temperature and tested with trypanosome antigen as in the diagnostic test.

Normal healthy horses	Unheated serum	Serum heated for one half hour at degrees Centigrade						
		50	54	56	58	60	62	64—65
No. 1	+ + + +	+ + + +	+ +	+	–	–	–	–
" 2	+ + + +	+ + + +	+ +	+	–	–	–	–
" 3	+ + + +	+ + + +	+ +	+	–	–	–	–
" 4	+ + + +	+ + + +	+ + +	+ +	–	–	–	–
" 5	+ + + +	+ + +	+	–	–	–	–	–
" 6	+ + + +	+ + + +	+ +	(?)	–	–	–	–
" 7	+ + + +	+ + + +	+ + +	+ +	–	–	–	–
" 8	+ + + +	+ + +	+	(?)	–	–	–	–
" 9	+ + + +	+ + + +	+ +	(?)	–	–	–	–
" 10	+ + + +	+ + +	+ +	+	–	–	–	–

Inhibition. Non-specific.

Dourine horses				
No. 1 (1st year of disease)	+ + + +	+ + + +	+ + + +	+ + + +
" 2 (" ")	+ + + +	+ + + +	+ + + +	+ + + +
" 3 (" ")	+ + + +	+ + + +	+ + + +	+ + + +
" 4 (" ")	+ + + +	+ + + +	+ + + +	+ + + +
" 5 (" ")	+ + + +	+ + + +	+ + + +	+ + + +
" 7 (" ")	+ + + +	+ + + +	+ + + +	+ + + +
" 7 (2nd " ")	+ + + +	+ + + +	+ + + +	+ + + +
" 8 (3rd " ")	+ + + +	+ + + +	+ + + +	+ + + +
" 9 (4th " ")	+ + + +	+ + + +	+ + + +	+ + + +
" 10 (5th " ")	+ + + +	+ + + +	+ + + +	+ + + +

Specific complement-fixation.

Normal		Unheated	50	54	56	58	60	62	64—65
Mule No.	1	+ + + +	+ + + +	+ + + +	+ + +	+	–	–	–
"	2	+ + + +	+ + + +	+ + + +	+ + + +	+ +	+	–	–
Donkey No.	1	+ + + +	+ + + +	+ + + +	+ + +	+ +	+	–	–
"	2	+ + + +	+ + + +	+ + + +	+ +	+	–	–	–

Inhibition Non-specific.

+ + + + See page 28 for the meaning of these reaction expressions.

Note.—In the non-specific inhibition reactions the red cells are loosely sedimented. In the specific complement fixation reactions the red cells are precipitated in a mass or agglutinated in lumps. When the sera are tested *without antigen,* as in the serum controls, the dourine sera, of course, give no specific reactions, but the inhibition reactions are given by normal and dourine sera alike when insufficiently inactivated, though to a lesser degree than when antigen is present.

Conclusion.—Suspected horse serum must be heated to at least 58° C. (59-60° for safety) and mule or donkey serum to 62° C., to eliminate non-specific reactions.

The Antibody content of Dourine Sera, and the dose of suspected Serum necessary for a Diagnostic Test.

The maximum dose of horse serum used in a diagnostic fixation test is 0·2 c.c. This amount is not exceeded for fear of any disturbance to the haemolytic system by the non-specific reactions which larger doses are apt to cause. Double the amount can actually be used with perfect safety provided the serum is correctly inativated. But it is unnecessary to use more than 0·2 c.c., for that amount of serum of a dourine horse will contain in the case of a serum very weak in antibody content at least one unit, and in the case of a serum strong in antibody ten, twenty, forty or more units—and one unit of antibody is sufficient to give a positive reaction with the fixation test.

That this is so may be determined by taking a series of sera collected from animals in active and in latent phases of the disease and titrating out each serum for antibody content.

The experiment is carried out as follows:—

The sera are first inactivated by heating for one half hour at 59° C. Three stock tubes are then taken for each serum, (1) containing the pure serum, (2) a dilution of 1:10, and (3) a dilution of 1:100, these dilutions permitting of the accurate measurement of the smaller doses.

Twelve tubes are now arranged for each serum to be tested—the first and last to contain 0·2 c.c. of undiluted serum, the largest amount used in the test, the last tube being the serum control without antigen, the intervening tubes to contain gradually decreasing doses of serum. Enough salt solution is then added to make up to 1·0 c.c. in each tube, then the antigen and complement in amounts previously determined by careful titration, and finally, after incubation for seventy minutes, haemolytic serum and red cells—as in a diagnostic test.

An experiment of this kind is given below, the titres of seven sera from different horses in different phases of the disease being determined.

Experiment for determining the Antibody content of Dourine Sera by the Complement Fixation Method.

Dose of inactivated dourine serum	Complement fixation reactions with dourine serum.						
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
c.c. 0·2 (undiluted, standard doses)	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +
0·15	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + +
0·1	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ +
0·075 (0·75 of 1 : 10).......	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+
0·05 (0·5 " ").......	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	—
0·025 (0·25 " ").......	+ + + +	+ + + +	+ + + +	+ + + +	+ + +	+ + + +	—
0·01 (0·1 " ").......	+ + + +	+ + + +	+ + + +	+ + + +	+ +	—	—
0·0075 (0·75 " 1 : 100)......	+ + + +	+ + + +	+ + + +	+ +	+	—	—
0·005 (0·5 " ")......	+ + + +	+ + + +	+ +	+	—	—	—
0·0025 (0·25 " ")......	+ +	+ +	—	—	—	—	—
0·001 (0·1 " ")......	+	—	—	—	—	—	—
0·2 (serum control without antigen)...............	—	—	—	—	—	—	—
Indicated value of one antibody unit..................	0·005	0·005	0·0075	0·01	0·05	0·025	0·2
Number of antibody units in 0·2 c.c. of dourine serum—maximum dose............	40	40	26½	20	4	8	1

+ + + + means complete fixation of complement—absolutely no trace of haemolysis. Red cells more or less clumped. A very strong positive reaction.

+ + + is also a strong positive reaction, with just a faint trace or tinge of haemolysis.

+ + is a rather weak positive, indicating partial fixation—about one-half the red cells haemolysed.

+, a very weak or faint positive—slight fixation, with more than one-half the red cells haemolysed.

—, a negative reaction. Complete haemolysis of red cells.

The smallest dose of serum which combines with antigen to cause complete fixation (+ + + +) indicates the value of one antibody unit, and from this may be calculated the number of units in the standard or maximum dose and the value of a dourine serum in antibody content.

Such values are more relative than absolute, for the titre of a dourine serum may be somewhat higher or lower according to the amount of dourine antigen present and the fineness with which the haemolytic system has been adjusted—just as the titre of the haemolytic serum itself is correlative to the amount of complement and red cells (antigen).

The seven sera, Nos. 1-7, used in this experiment are taken from dourine control horses in the first, second, third, fourth, fifth, sixth and seventh year of the disease, respectively. No. 1 from a mare showing clinical symptoms; No. 2 from a stallion showing occasional symptoms; Nos. 3 and 4 from mares very rarely showing symptoms and progressing towards recovery; Nos. 5. 6 and 7 from mares that have not shown any symptoms for three, four and five years respectively, and which have made complete recovery, been bred to a healthy stallion each year—without transmitting infection—and raising healthy offspring.

In addition to the above, among our experimental horses that have recovered from dourine, there are two mares that give a positive (+ + + +) reaction with 0·2 c.c. serum after six years, and one mare a positive (+ + +) after seven years. On the other hand, there are three mares that have entirely ceased to react, even with two or three times the amount of serum, after six to seven years of recovery, although they reacted positively up to the fifth year.

Conclusion.—0·2 c.c. of horse serum from a dourine infected animal contains up to forty units of specific antibody. In the case of horses that have completely recovered from dourine and which are no longer able to transmit the disease, one or several units of antibody are present in the same amount of serum up to the fifth year of recovery. After that period they may cease to react—indicating that not only was an absolute recovery made but that the immunity was lost in about five years (proof of which has been given by inoculation experiments with *T. equiperdum* on recovered horses).

For diagnostic tests it is sufficient to use three doses of serum, namely, 0·2, 0·15 and 0.1 c.c.

The first appearance of a positive serum reaction in dourine infections.

Having fixed upon a standard dosage of suspected serum, it is now necessary to know the incubation period of dourine and when a first positive serum reaction may be expected, for otherwise a negative reaction would be valueless or even misleading.

In this connection there follow the records of some experiments:—

Experiment for determining the length of time between dourine infection and the first appearance of a positive serum reaction.

A healthy filly 2½ years old, was infected with dourine by smearing over the vaginal mucosa a few drops of blood containing *Trypanosoma equiperdum*.

Serum was collected from this young mare before infection and daily up to the fifteenth day after infection, and tested by the complement-fixation method, with trypanosome antigen. The results were as follows:—

Dose of serum	Before infection	Days after infection					
		1 to 10	11	12	13	14	15
c.c.							
0·2	–	–	+ + +	+ + + +	+ + + +	+ + + +	+ + + +
0·15	–	–	+ +	+ + + +	+ + + +	+ + + +	+ + + +
0·1	–	–	+	+ + +	+ + + +	+ + + +	+ + + +
0·05	–	–	–	+ +	+ +	+ + + +	+ + + +
0·01	–	–	–	–	–	+	+ +
0·005	–	–	–	–	–	–	+

Thus, the first appearance of a positive serum reaction was eleven days after infection.

In three earlier experiments of this kind, but in which serum was not collected for testing until the twentieth day after infection, the reaction in each case was strongly positive.

The incubation period of dourine in the light of the complement-fixation test is indicated, by the above experiments, as not less than eleven days and not over twenty days. However, the strain of dourine used in these experiments was of high virulence; when horses become infected with strains of low virulence—and there is much variation in dourine strains—the incubation period is probably prolonged.

A negative reaction should not be taken as final or conclusive when the interval between exposure to infection and the collection of test serum is less than two months.

IV. The Diagnostic Test.

Two methods of procedure are here recommended:—

(1) When only one or several tests are to be made.

(2) For daily routine testing or when 50, 100, or more tests are to be made at one time.

In either case a necessary preliminary is the titration of complement (*vide,* p. 166). This established, sufficient complement dilution is made up—0·5 c.c. of the dilution to contain the smallest amount indicated by titration—to do for the titration of antigen and for as many serum tests and controls as are to be made. It is advisable to make up an excess of complement rather than have a deficit, so as to use one stock uniform dilution throughout and avoid having to make up fresh stocks during the testing.

The trypanosome antigen is then titrated against a known positive dourine serum and a known negative serum (*vide,* p. 167).

First method of procedure—for one or several tests.

Four tubes and one pipette of 1·0 c.c. capacity, graduated 1–100, are needed for each serum to be tested. 1·0 c.c. salt solution is measured into each tube. In each set of four tubes 0·2, 0·15, 0·1 and 0·2 c.c. of the inactivated test serum is added. Antigen in the amount already decided by titration is now added to the first three tubes in each set, omitting it from the fourth tube which serves as a serum control. Complement, 0·5 c.c. of the dilution required, is then added to all tubes. Sets of positive and negative sera are included with the above, and, in addition, controls for the various reagents. For the reagent controls five tubes are needed: (1) Antigen control, omitting the test serum, (2) haemolytic control, omitting serum and antigen, (3) haemolytic serum control, omitting test serum, antigen and complement, (4) complement control, omitting test serum, haemolytic serum and antigen, (5) red cells control, containing only red cells and salt solution. The controls are made up to a uniform volume of 2·5 c.c. by adding salt solution as required.

When the test serum, antigen and complement have been mixed together, the tubes are incubated at 38–39° C. for 70 minutes.

Equal quantities of the haemolytic serum dilution and the red cell suspension (4 per cent) are mixed together and 1·0 c.c. of the mixture added to every tube excepting the last two controls, Nos. 4 and 5, to which 0·5 c.c red cells only are added.

The tubes are again shaken and incubated for another two hours when the reactions may be read, a second reading being made the following morning, about twelve hours later, the racks being left at a cool room temperature meanwhile.

The above procedure is indicated in the following table:—

Table showing method of procedure for a diagnostic fixation test.

	Tube No.	Salt solution	Test serum	Antigen	Comple-ment	Mixture of haemolytic serum and red cells	Fixation	Reaction
		c.c	c.c.	c.c.	c.c.	c.c.		
Diagnostic set for each suspected serum								
	1	1·0	0·2	0·2	0·5	1·0	+ + + +	*Strong* + + + *Weak*
	2	1·0	0·15	0·2	0·5	1·0	+ + + +	*positive* + + *positive*
	3	1·0	0·1	0·2	0·5	1·0	+ + + +	+
Serum control	4	1·0	0·2	—	0·5	1·0	—	(haemolysis) — (haemolysis)
Test control with known positive serum	1	1·0	0·2	0·2	0·5	1·0	+ + + +	Complete fixation.
	2	1·0	0·1	0·2	0·5	1·0	+ + + +	" "
Serum control	3	1·0	0·2	—	0·5	1·0	—	Complete haemolysis.
Test control with known positive serum	1	1·0	0·2	0·2	0·5	1·0	—	Complete haemolysis.
	2	1·0	0·2	—	0·5	1·0	—	" "
Reagent controls :—								
(*a*) Antigen	1	1·0	—	0·2	0·5	1·0	—	Complete haemolysis.
(*b*) Haemolytic system	2	1·0	—	—	0·5	1·0	—	" "
(*c*) Haemolytic serum......	3	1·5	—	—	—	1·0	. .	No haemolysis.
						Red cells only		
(*d*) Complement	4	1·5	—	—	0·5	0·5	. .	" "
(*e*) Red cells	5	2·0	—	—	—	0·5	. .	" "

70 minutes at 38–39° C.

2 hours at 38–39° C. First reading of reactions.

12 hours at cool room temperature. Second reading of reactions.

Second method of procedure—for daily routine testing or when 50, 100, or more tests are to be made.

This is only a slight modification of the first method of procedure to allow of more rapid and less laborious work in testing large numbers of suspected sera.

Two test series are made, the first series, in which only one tube for each serum is used (instead of four tubes as before), containing the maximum dose, 0·2 c.c., and antigen, eliminating all negative sera and at the same time indicating the positive sera. These latter are again tested on the following day, using the four tubes—the three standard doses of serum and serum control—as in procedure No. 1, including them with the next lot of sera to undergo the first test in which the single tube is used.

If a negative serum does not give a fixation reaction with 0·2 c.c. serum it certainly will not with the lesser doses, and as a serum control is only needed in the case of a serum which fixes complement, the single tube is obviously all that is required to determine a negative serum. Further, the sera with which complement-fixation takes place in the one series serve as additional controls when included with and fully tested out in the second series—one day's work thus checking the other, continuously.

In routine testing at this laboratory, when large numbers of sera are being dealt with, it is the practice to make a repeat test with each serum negative at the first test and to arrange the work and the different series so that each day's tests include: (*a*) a series not before tested (one tube for each serum); (*b*) the sera tested the day before with negative result (one tube for each serum); (*c*) the sera tested the day before with fixation reactions (four tubes for each serum); and, in addition, the usual series of known positive dourine sera, negative controls and reagent controls.

All suspected sera are thus tested twice over so that if any error or omission in the technique has been made it will surely be indicated.

Interpretation of the reaction.—Fixation of the complement, not in itself visible in the test tube, is indicated by the prevention of haemolysis of the red cells and constitutes a positive reaction, on which a diagnosis of dourine is given.

When no complement is fixed the red cells are completely haemolysed and the reaction is then said to be negative.

The prevention or inhibition of haemolysis may be complete, partial or slight—according to the richness of the serum in specific antibodies. However, with the standard doses of serum, in the great majority of cases, the reaction is either clearly positive or clearly negative. Occasionally, complement fixation complete with 0·2 c.c. serum, partial with 0·15 c.c. and slight with 0 1 c.c. may be given. This is a positive reaction and indicates that the serum is weak in antibodies, only one unit being present in 0·2 c.c. serum.

Partial fixation with 0·2 serum and complete haemolysis with 0·1 serum is a rare reaction and of a questionable nature. In the serum controls, without antigen, haemolysis should always be complete. Very rarely indeed it happens that haemolysis in the serum controls is not complete, the mixture having a cloudy or opaque appearance and some of the red cells remaining unhaemolysed. This may be the result of insufficient inactivation or of changes in the serum due to certain bacterial growths. When such questionable reactions are given a fresh specimen of serum is asked for and a retest made.

General Remarks.

The successful practice of the complement fixation test depends mainly upon the preparation and use of powerful reagents, their specificity and the accurate determination of their relative values, the fixing of standard doses wherever possible, and a constant, uniform technique and method of procedure.

Close familiarity with the activity of the reagents is essential for the best results.

Stock reagents should be prepared in quantities calculated to meet all requirements for as long a time as the activity of the reagents remains practically constant. Thus: sufficient haemolytic serum for six months' work; antigen to suffice for one month's work; fresh red cell suspension once a week; fresh complement daily or on alternate days, or as needed. It is advisable to use the blood of two sheep for sensitizing rabbits and to use the red cells of the same sheep for the haemolytic system.

The following points of extreme importance will bear repetition:—

(1) The amount of red cells in suspension must be very accurately measured and the standard amount never varied.

(2) The use of the least possible amount of complement which with two units of haemolytic serum causes complete haemolysis of red cells.

(3) The use of twice the amount of antigen which with a dourine antibody unit is necessary to fix the complement, provided the same amount of antigen alone has no inhibitory action.

(4) Careful control of the inactivation of suspected sera by known positive and known negative sera.

(5) Control of the diagnostic tests by a series of known positive sera, each having an antibody unit of different value, high to low.

Discussion.

The reliability of the complement fixation test as a certain and specific means of diagnosis has been questioned, not, I think, very seriously or on strictly scientific grounds, but more in respect to its practical application and on an unwarranted supposition that it is still very imperfectly understood, that the technique and method of procedure is so intricate and laborious, that the reactions themselves are subject to and have to be guarded against so many possible disturbing influences that the adoption of such a method of diagnosis is attended with considerable risk.

Can the test be practically applied?—Yes, without doubt, and with as much ease as a mallein or tuberculin test is applied. In the one case blood is collected in the field and sent in for a laboratory test; in the other the reagents are prepared in the laboratory and sent out for a field test. Further, as many retests can be made by the complement fixation method as desired, for no toxins or immunizing substances are injected into the suspected animal to interfere with subsequent diagnostic tests. This test is no longer a new departure in veterinary diagnosis; it is successfully applied in glanders, contagious abortion and in other specific diseases and is yearly coming into more general use.

Are the test reactions and the different factors concerned in them imperfectly understood?—Such a view is not held by serologists and can only be retained by those who have not the opportunity of closely studying the subject and becoming familiar with the finer points of it. Any attempt to apply the test by one who has not thoroughly mastered the technique and gained complete control of the reagents would, of course, be dangerous. But the complement fixation reaction furnishes the most perfect, biological, diagnostic test yet devised, one in which all adverse or disturbing factors can be eliminated and in which a clear knowledge of the properties and mode of action of the reagents has been ascertained,—far more so, in fact, than that of a mallein or tuberculin reaction which, in application and interpretation, is crude in comparison. The very delicacy of the fixation reaction and the strict laws and conditions governing it, add to the exactness, value and reliability of the test.

Is the technique too intricate and laborious?—Not more so than many other necessary and accepted laboratory methods, and this is essentially a laboratory test.

Is it necessary to use a pure suspension of trypanosomes as antigen?—By the employment of a pure suspension of dourine trypanosomes as antigen non-specific and false or misleading reactions are avoided. Many other ways of preparing antigen for the dourine test have been tried by different investigators but, with one exception, with little success. Mohler and Eichhorn recommend a spleen preparation of a rat dead from surra. I have used the spleens of rats dead from dourine in several thousand tests and with very good results, but, on the whole, such preparations are inferior to the trypanosome suspension and possess a number of disadvantages. Spleen preparations are often troublesome on account of a more or less anticomplementary action or owing to a weakness in specific antigenic property. They are very unstable and of inconstant value and give rise to many borderline or questionable reactions which can be eliminated or definitely decided by the trypanosome antigen. In comparative titrations of dourine sera with the two forms of antigen I have found that approximately one-tenth of the amount of serum necessary for a positive reaction with spleen antigen suffices for a clear positive reaction with trypanosome antigen. Very weak positive reactions with the former become clearly and strongly positive with the latter, which, therefore, should always be given the preference. The trypanosome suspension has also the great advantage of retaining a constant value for several weeks at least, for six to eight weeks if carefully prepared, and thus allows of the keeping of a uniform stock antigen.

What is the percentage of positive reactors in dourine outbreaks?—This of course varies according to the length of time the disease has been in existence in a stud or range herd before being checked by preventive measures. In the most extensive outbreak that we have had to deal with 456 positive reactors were found in a total of 2,000 animals tested; nearly 23 per cent. In an outbreak on an Indian Reservation, 127 animals gave positive reactions out of 1,464 tested, or less than 9 per cent. Usually it is between 15 and 20 per cent. Our experience indicates that 100 per cent of dourine infected animals, whether in active or latent stages of disease, give positive serum reactions, provided that an interval of two to three months has been allowed for an incubation period in the more or less resistant animals, less than one month being sufficient in most cases.

How does the value of the dourine test compare with the Wassermann test for syphilis?—The old name of horse syphilis still clings to dourine infections, especially among stock owners and the general public, and comparisons have been made both in regard to the nature of the disease and the diagnostic tests, tending to lead to mistaken conclusions.

The reaction in dourine by the method recommended in this paper is a specific one. A positive reaction in other diseases or with animals in which dourine infection could be excluded, remains unknown to us, while in every authentic case of dourine the reaction is invariably positive. In my whole experience there is only one case in dispute—a negative serum reaction being given where a symptomatic diagnosis of dourine was made. However, the symptomatic diagnosis may have been at fault; unfortunately, the animal was destroyed before any proof or disproof of dourine infection was forthcoming.

The very few cases on record where a negative dourine reaction at a first test was followed by a positive reaction at a second or later test can be accounted for by infection taking place only a few days before the serum was first collected, or by continued exposure to infection between the first and later test.

In syphilis, on the other hand, negative reactions are of more value for prognosis than for diagnosis. A positive reaction may become negative after a short course of treatment, returning again to positive if a cure has not been effected. Further, it is admitted that a negative reaction is frequently given in primary syphilis and again at times in latent and tertiary syphilis. A source of error, operating in the negative direction, is, as Noguchi has pointed out, in that human serum contains a variable amount of natural anti-sheep amboceptor, which in some cases may be sufficient to hide a positive reaction. Horse serum does not contain anti-sheep amboceptor, as I have found by many experiments, so that the anti-sheep haemolytic system can be used in horse serum tests with perfect reliance.

A positive Wassermann reaction may be given in several diseases in which syphilitic infection can be excluded, in leprosy, scarlatina, certain forms of tuberculosis and carcinoma. The Wassermann reaction is not specific. Owing to the great difficulty of obtaining a pure syphilitic antigen, the extract of a syphilitic liver was first used in Wassermann's original method. But, later on, it was found that non-specific extract of normal liver and other organs answered equally well, and such are now commonly used. The reaction in syphilis is not accordingly a true and specific antigen-antibody combination and is dependent upon more or less gross changes in the serum of syphilitic patients. It is not to be compared, therefore, and is greatly inferior to our test method for dourine either in delicacy, specificity or trustworthiness.

In conclusion, I venture to express absolute confidence in the complement fixation test for dourine as it is now presented, and to claim that apparent failures or discrepancies are due, not to the method itself, but to faulty technique on the part of the operators or of the collectors of the test serum.

APPENDIX No. 3.

EXPERIMENTAL DOURINE.

Horses.—Tr. equiperdum is always pathogenic for the horse. If introduced into the vaginal tract of a healthy mare it reproduces the disease in a similar fashion to that which follows an infective coitus. A subcutaneous inoculation of trypanosomes, obtained from a plaque, oedematous swelling or vaginal secretions, is followed in about 10 days time by a small swelling at the seat of inoculation. In the serous fluid of such a swelling multiplying trypanosomes are to be found. This primary lesion disappears in a few days and the disease evolves as in a case of natural infection, especially if the inoculation has been made via the genital organs.

It is essential that the material inoculated contains the specific trypanosome of dourine. Blood drawn from the general circulation of dourined horses rarely contains trypanosomes and thus rarely reproduces the disease when inoculated into healthy subjects. Direct transfusions of blood or inoculations of large quantities repeated at intervals over several weeks have failed to set up an infection. Only during a very active stage of the disease, as during a period of plaque eruption, is an inoculation of blood from the general circulation likely to be successful.

The virulence of a strain of dourine can be raised to a high degree by a series of rapid passages through young animals. In this way the disease is rendered more acute in foals or yearling horses, running its course in about six weeks in males and in about three months in females, a high and remittent fever being the dominant feature throughout (*vide* Chart No. II and compare with Charts Nos. I and III).

The trypanosome virulence for horses is raised to its maximum degree by passage through laboratory animals, viz., white mice, rats and guineapigs. In horses infected with trypanosome blood taken from a rat or guineapig the disease makes rapid and continuous progress. There is scarcely any remission of symptoms. Trypanosomes soon appear in the general circulation and are present there in varying numbers up to the time of death, which occurs in from six weeks to three months, in adult horses. In this connection it is well worth noting that 11 horses and 1 donkey have been experimentally infected with trypanosomes which had been passed through a rat or guineapig, and that in all 12 animals trypanosomes appeared in the general circulation. On the other hand, 24 horses have been experimentally infected with trypanosomes of seven or eight different equine origins and previous to passage through laboratory animals, and in none of these 24 animals were trypanosomes ever to be seen in the general circulation. Similarly, hundreds of blood examinations for trypanosomes in cases of natural infection likewise proved negative.

This exalted trypanosome virulence and the acquired habit of the parasite to live in the bloodstream of horses after a passage through laboratory animals has been maintained for several generations in horses.

Laboratory animals.—Very great difficulty is experienced in transmitting equine dourine to laboratory animals. The white mouse seems to be the least resistant; even so, it may be necessary to inoculate series after series before obtaining a single successful infection. However, once this is accomplished, the trypanosome can be passed through rats, guineapigs, rabbits, dogs, cats, etc., with great ease, from an animal of one species to that of another and carried on indefinitely without loss of virulence.

The adaptation of the trypanosome for laboratory animals is not lost by subsequent passage through horses, at least not for several generations.

Mice and rats.—The transmission of Canadian dourine to laboratory animals was effected by a successful inoculation of a white mouse after hundreds of unsuccessful attempts had been made with dogs, rabbits, guineapigs, etc. The origin of the strain was a naturally infected mare. During a period of four weeks in which this mare presented fresh plaques almost every day, 60 white mice and 24 rats were inoculated with fluid collected from the plaques, rich in trypanosomes. The first 83 inoculations (59 in mice and 24 in rats) failed; the eighty-fourth (in the sixtieth mouse) succeeded. From this mouse others were infected without any difficulty and the strain was passed on through the usual laboratory animals. In mice and rats only one trypanosome cycle is represented. The parasites appear in the blood on the second or third day after inoculation and multiply with rapidity up to the time of death, which in mice occurs usually in three to five days, and in white rats in four to six days. Death takes place suddenly and with scarcely any warning symptoms. When rats are inoculated in batches of 15 to 25 at one time, as when preparing a trypanosome antigen for complement-fixation work, it may happen that 15 or more rats out of 20 will die within the space of two to three hours on the fourth or fifth day. Often there are one or two rats in every 25 that show more or less resistance. Twenty-three out of 25 rats inoculated may die on the fourth to fifth day, the twenty-fourth rat may live ten to fifteen days and the twenty-fifth rat twenty to thirty days notwithstanding the fact that the trypanosomes present in the blood of these two resistant rats become even more numerous than in the rats which die in the normal time of four to six days. It would appear that in a mouse or rat infection when the end of the first trypanosome cycle is reached there is a sudden release and absorption of toxin which causes sudden death in the great majority of cases. Not more than 5 to 10 per cent of infected rats survive the shock, and these succumb to the second or third trypanosome cycle.

Guineapigs.—The duration of infection averages between six and eight weeks, as a rule. However, with a highly virulent rat strain of dourine guineapigs may succumb within two to four weeks. The appearance of trypanosomes in the blood is remittent or intermittent and the parasites are never as numerous as in rat's blood. Few symptoms can be noted and death occurs with suddenness. After a number of generations in guineapigs the strain is apt to loose virulence but this is easily restored by passing through a series of rats.

Rabbits.—Infected rabbits present a train of more or less characteristic symptoms, viz., oedematous swellings of the external genital organs and of the ears, purulent conjunctivitis and other ocular lesions, cutaneous lesions, progressive emaciation, cachexia and death in from one to three months. The parasites appear in the general circulation with remissions or intermissions and are rarely numerous.

Dogs.—Pronounced and typical symptoms of trypanosomiasis are presented—fever, oedemas of the skin and genital organs and very severe ocular troubles; the eyeball protrudes and has an anxious, staring expression (exophthalmia), and there is a keratitis and staphyloma. There is locomotary disturbance and a great feebleness and a tendency to sleep almost continuously. Emaciation and paralytic conditions precede death.

As already stated, in the first direct transmission of dourine to laboratory animals all attempts to infect dogs, rabbits, and guineapigs failed, and success was only achieved through a white mouse. The trypanosome was then passed through rats and no further difficulty was experienced in infecting other species of small animals. Further, when a horse was infected with a dourine strain maintained in laboratory animals, the trypanosomes recovered in the blood of this horse were always infective and highly virulent for dogs and all other species of laboratory animals. So easy had transmission then become that dogs were infected by injestion, by eating the flesh of horses which had succumbed to trypanosome infection.

A horse was destroyed *in extremis* and a post-mortem examination was made immediately after death. Trypanosomes were found present in the blood of all the organs and muscles examined. A piece of flesh was fed to two dogs with little expectation that they would become infected. However, three weeks after the feeding the dogs appeared to be easily fatigued, dull and somewhat depressed. On the twenty-ninth day a careful search of blood taken from the ear revealed a very few trypanosomes. On the thirty-fifth day the parasites were fairly numerous, and the dogs appeared to be very ill. The eyes had a bulging, stony appearance. The face was rather puffy and expressionless. For several days there had been attacks of vomiting and diarrhœa. For short intervals the animals were very restless, but most of the time were very depressed and slept for many hours at a stretch.

An intravenous injection of 0·2 grammes of Salvarsan ('606') in 100 c.c. of alkaline solution was given and within forty-eight hours all trypanosomes had disappeared from the blood stream. The change and improvement were astonishing. At the time of the injection the animals were so weak that they had to be propped up and supported. Three days later they were running about, barking and playing. However, on the fifty-ninth day in one, and on the sixty-fourth day in the other, there occurred a relapse. Symptoms recommenced and the parasites reappeared in the blood. A second injection of Salvarsan, 0·25 grammes in the one and 0·3 grammes in the other, was given. This time there was scarcely any noticeable change. The parasites remained in the circulation, the symptoms progressed and death occurred in eighty-one days in the one case and in ninety-five days in the other.

TABLE III.—Showing the exalted virulence of *Trypanosoma equiperdum* for horses after passage of the parasite through white rats and guinea (pigs.

Animal.	Inoculation of trypanosomes *before passage.*	Duration of disease and *recovery.*	Inoculation of trypanosomes *after passage.*	Predominating symptom.	Duration of disease and *death.*	Remarks.
Mare (41) (aged)	Feb. 17, 1907	(See Chart II) $5\frac{1}{4}$ years	June 12, 1912	Remittent fever	145 days	Trypanosomes in blood stream.
Foal (3f)	Aug. 16, 1908	$4\frac{1}{2}$ years	Feb. 14, 1913	"	29 days	" " "
Foal (5f)	Aug. 26, 1908	$4\frac{3}{4}$ years	June 12, 1912	"	90 days	" " "
Foal (1f)	Jan. 8, 1909	$3\frac{1}{2}$ years	" "	"	84 days	" " "
Stallion (30) (15 year old)			Feb. 14, 1913 (intravenous)	"	45 days	" " "
Mare (190) (2 year old)			Mar. 30, 1915 (intravaginal)	"	86 days	" " "
Gelding (130) (8 year old)			Feb., 23 1917 (subcutaneous)	"	81 days	" " "
Donkey (183) (7 year old)			June 7, 1915 (subcutaneous)	"	117 days	" " "

APPENDIX No. 4.

TRYPANOSOMA EQUIPERDUM.

The microscopical appearance of the trypanosome of dourine is very similar to that of other pathogenic trypanosomes of the *Brucei* type. In morphology, vitality and general biological features, there is little to distinguish it from the trypanosomes of surra, nagana, mal de caderas and sleeping sickness of man. Very common features of the dourine trypanosome are (1) the presence of a vacuole bordering upon the centrosome and (2) the blunted, cut-off or fish-mouth appearance of the posterior extremity.

Tr. equiperdum does not require any insect intermediary carrier or host and completes its life cycle in the body of its natural host—the horse—and is directly communicable from one horse to another.

Tr. equiperdum is the only known pathogenic trypanosome of tropical or subtropical origin that is maintained by natural means in the temperate zones and in countries far removed from tropical conditions.

In its natural host, naturally infected, *Tr. equiperdum* does not live as a true blood parasite but rather as a tissue parasite, selecting special organs, mucous membranes and the skin for its development and life cycle. In these respects the trypanosome of dourine differs from the trypanosomes of surra, nagana and the other trypanosome diseases.

The appearance, development, multiplication, conglomeration or agglutination, phagocytosis and intracellular digestion of *Tr. equiperdum* takes place in a single oedematous patch or plaque, and the whole phenomenon can be traced within, and usually occupies, 3 days. The following is an example:—

In a young mare, experimentally infected with a trypanosome strain (*before passage through laboratory animals*), three- to four-day periods of fever recurred at twenty-four to twenty-eight day intervals and, at the same time or preceding the rise in temperature by one to two days, an oedematous swelling of the labium pudendi. Examinations of the fluid contents of the patch were made on the first sign of tumefaction or oedema and continued at intervals of a few hours throughout the stages of eruption and absorption. The procedure at each examination was to make a fine needle puncture and with the drop of serous fluid exuding make two dry smears and one wet coverglass-celled preparation. The latter was examined immediately, the former being stained by the Giemsa method. In the first specimens thus obtained the trypanosome could be located only with great difficulty being so few in number. In the subsequent specimens increasing numbers and multiplication forms were noted up to the thirty-sixth hour. At the 40th hour conglomerations of trypanosomes and attachment to the phagocytes were noted. At the forty-fourth hour nearly all the trypanosomes were injested by the macrophage cells and in various stages of digestion and disintegration. At the forty-eighth hour no trypanosomes could be identified as such, though in some of the macrophage cells fragmenting parasitic nuclei could be made out. On the third day the swelling diminished in size, was further reduced on the fourth and was quite absorbed by the end of the fifth day. No trypanosomes could be seen in the specimens taken on these days.

Similar observations were made on a number of occasions and in different horses. In one case in which depigmentation of the skin of the labia pudendi was taking place, it was noted that simultaneously with the macrophagic injestion of the parasites numbers of these phagocytic cells were crowded with blackish granular pigment. In smear preparations many of these swollen cells ruptured and let escape masses of black granules.

Agglutination and phagocytosis of the trypanosomes cannot be observed in all cases and, in fact, only in the minority. The later history of these cases shows that the infection was well tolerated and the inference is that agglutination and phagocytosie is an indication of increasing resistance and of the process of immunity.

Little is known of the nature and properties of trypanosome toxines. In the acute, generalized infections of small laboratory animals, and in which only one trypanosome cycle is represented, death apparently results from the sudden release and rapid absorption of toxin at the time of maximal trypanosome multiplication and commencing disintegration. In the chronic, intermittent disease in the larger animals commencing in a local infection, the trypanosome repeats its cycle again and again and the toxic action on the nervous system appears to be progressive and cumulative.

Attempts to cultivate *Tr. equiperdum* on artificial culture media and to isolate a toxin have not succeeded in the hands of the writer.

APPENDIX No. 5.

REGULATIONS RELATING TO MALADIE DU COIT.

By Order in Council dated 22nd July, 1911, in virtue of the Animal Contagious Diseases Act, R.S.C., 1906.

1. No animal which is affected, or suspected of being affected with Maladie du Coït shall be permitted to run at large or to come in contact with any animal which is not so affected, and no such animal shall, in any case, be used for breeding purposes.

2. Any inspector may declare to be an infected place within the meaning of "The Animal Contagious Diseases Act," any common, field, stable, or other place or premises where animals are found which are affected or suspected of being affected with Maladie du Coït.

3. No horse, ass or mule shall be removed out of any place so declared to be an infected place without a license signed by an inspector.

4. The Veterinary Director General may from time to time order the slaughter, castration or other disposition of animals affected with Maladie du Coït.

5. Inspectors are hereby authorized to inspect any animals affected with Maladie du Coït, or suspected of being so affected or which have been in contact with animals so affected, or suspected of being so affected or which have been in any way whatever exposed to the infection of Maladie du Coït, and may order any such animals to be collected, detained, isolated, castrated, or otherwise dealt with as may to them appear advisable.

6. The expenses of, and incidental to the collection of, isolation, seizure, castration, or otherwise dealing with animals for the purposes of these regulations, shall be borne by the owners of the animals, and no indemnity shall be allowed to the owner in case of damage arising out of or resulting from such actions, except as hereinafter provided.

7. No entire horse, ass or mule nor any ridgling more than one year old shall be permitted to run at large on unfenced lands in the province of Alberta or in that portion of the province of Saskatchewan lying west of the third principal meridian.

8. Any entire horse, ass or mule or any ridgling more than one year old found running at large within the area defined above may be seized and held on the order

of any duly authorized veterinary inspector of the Department of Agriculture, who shall forthwith whenever possible notify the owner of the said animal of such seizure, and the said animal, if not claimed within thirty days of such seizure, may be castrated, and no indemnity shall be allowed to the owner in case of damage arising out of or resulting from said castration, seizure or detention.

9. Animals affected with Maladie du Coït, may on an order signed by a duly appointed veterinary inspector acting under special instructions from the Veterinary Director General, be forthwith slaughtered, and the carcases disposed of as in such order provided, and compensation may be paid to the owners of such animals if and when the Act so provides.

10. Before an order is made for the payment of compensation in any of the cases aforesaid there must be produced to the Minister of Agriculture a satisfactory report, order for slaughter, and certification of valuation and slaughter, all signed by an inspector.

APPENDIX No. 6.

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EXPLANATION OF PLATES.

Plates I, II and III—

Natural infection of Stallion No. 35, showing eye lesions, fluctuating oedema, progressive emaciation and final stages of the disease.

Plate IV—

Stallion, No. 33, naturally infected with Dourine (1905-1907).

Plate V—

Experimental infection of mare No. 66, showing a ring-shaped or hollow-centre "plaque," the ninth to appear, in the tenth month inoculation. Figure 1.

Fig. 2.—Natural infection of mare No. 42, showing facial paralysis.

Fig. 3.—Paraplegia in a naturally infected mare.

Plate VI—

Figs. 1, 2 and 3.—Experimental infection in young fillies, showing typical oedematous patches of the anus (fig. 1), of the labia pudendi (fig. 2), and of the skin between the buttocks. (Fig. 3).

Figs. 4 and 5.—Natural infection of mare No. 159, showing depigmental skin of the vulva and anus and the transient character of such depigmentation. Fig. 5 shows the condition ten months later than fig. 4.

At the time these photographs were taken (figs. 1-5), trypanosomes were present in the oedematous fluids, in each case.

Plate VII—

Trypanosoma equiperdum in the oedematous fluid of a swollen labium pudendi, showing the development, multiplication, agglutination, phagocytosis and digestion of the parisites—all taking place within the space of 48 hours.

Plate VIII—

Trypanosoma-equiperdum.

Plate IX—

Trypanosoma equiperdum—the flagellated micro-organism causing Dourine, as seen in the vaginal mucous fluid (figs. 1-8) and in the oedematous fluid from swollen patches of the vaginal membranes (figs. 10-18); taken from a naturally infected mare (animal No. 36).

EXPLANATION OF CHARTS.

HISTORY—CHARTS Nos. I, II, AND III.

These charts epitomize the history of forty-two cases of dourine in horses, twenty-two being naturally infected and twenty experimentally inoculated.

The chief points of interest and conclusions are:—

The fatality in stallions.

The tolerance and recovery in mares and the relative immunity obtained to reinfection by natural means.

Tolerance and acquired immunity to inoculations of a natural strain of dourine (horse) is broken by inoculations of a laboratory strain (rats and guineapigs) and death follows.

In some of these mares the period of observation is fifteen years, in others twelve, ten, and a lesser number of years. Mares spontaneously cured of the disease have shown their usefulness for work purposes and for breeding. No case of natural transmission to the offspring has been observed. The four healthy stallions kept for breeding these naturally cured mares escaped infection.

Specific serum properties, as shown by the complement-fixation test, are retained in some cases for many years after recovery and cure; in others these properties are lost in about five years (see Appendix 2).

History Chart No. II shows the origin and genealogy of a strain of dourine in horses, and the exalted virulence obtained by serial passage through foals, and is supplemented by: Temperature Charts Nos. I, Ia, Ib, Ic; II, IIa, IIb; III; IV; IX and X.

PLATE I.

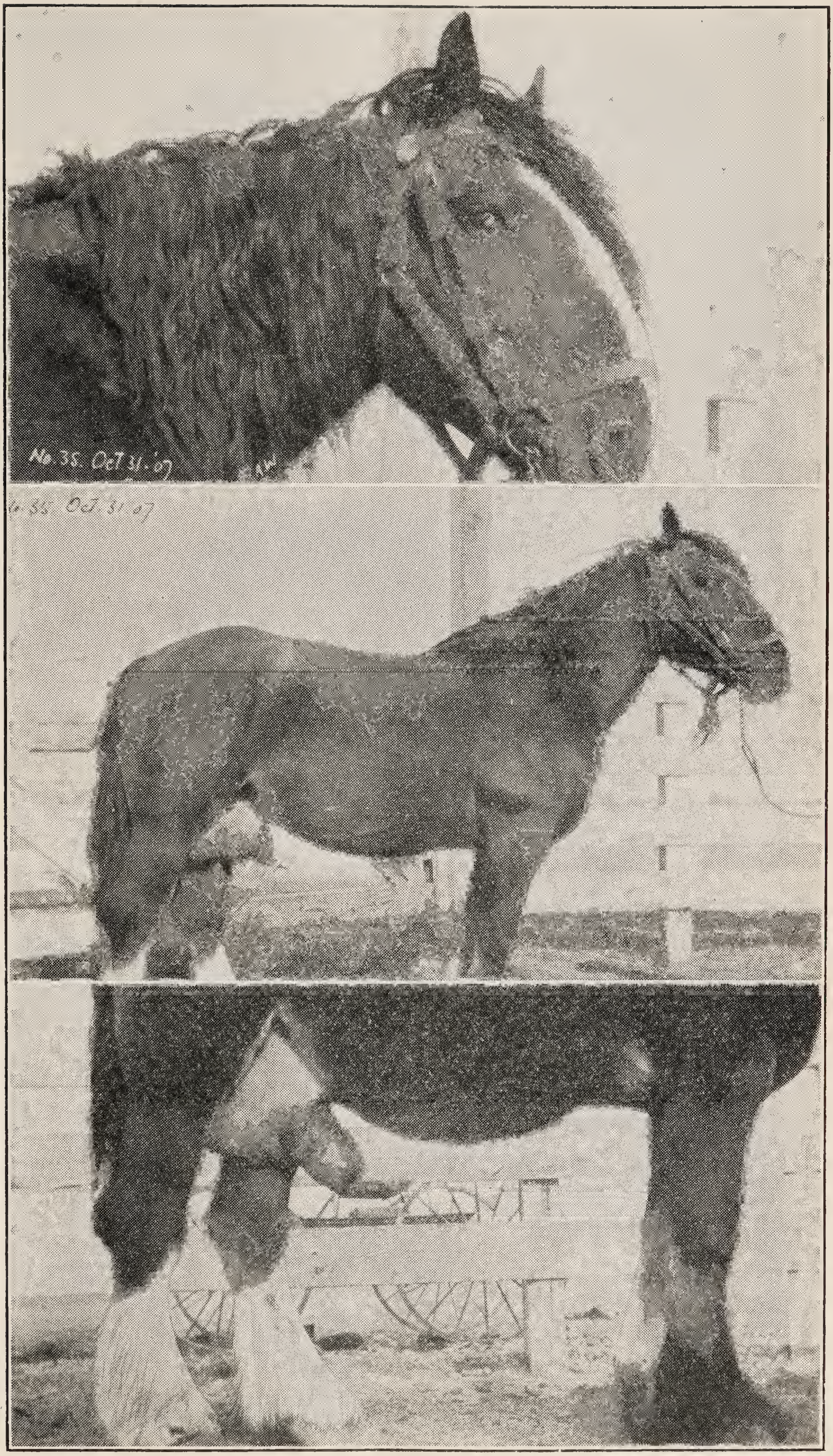
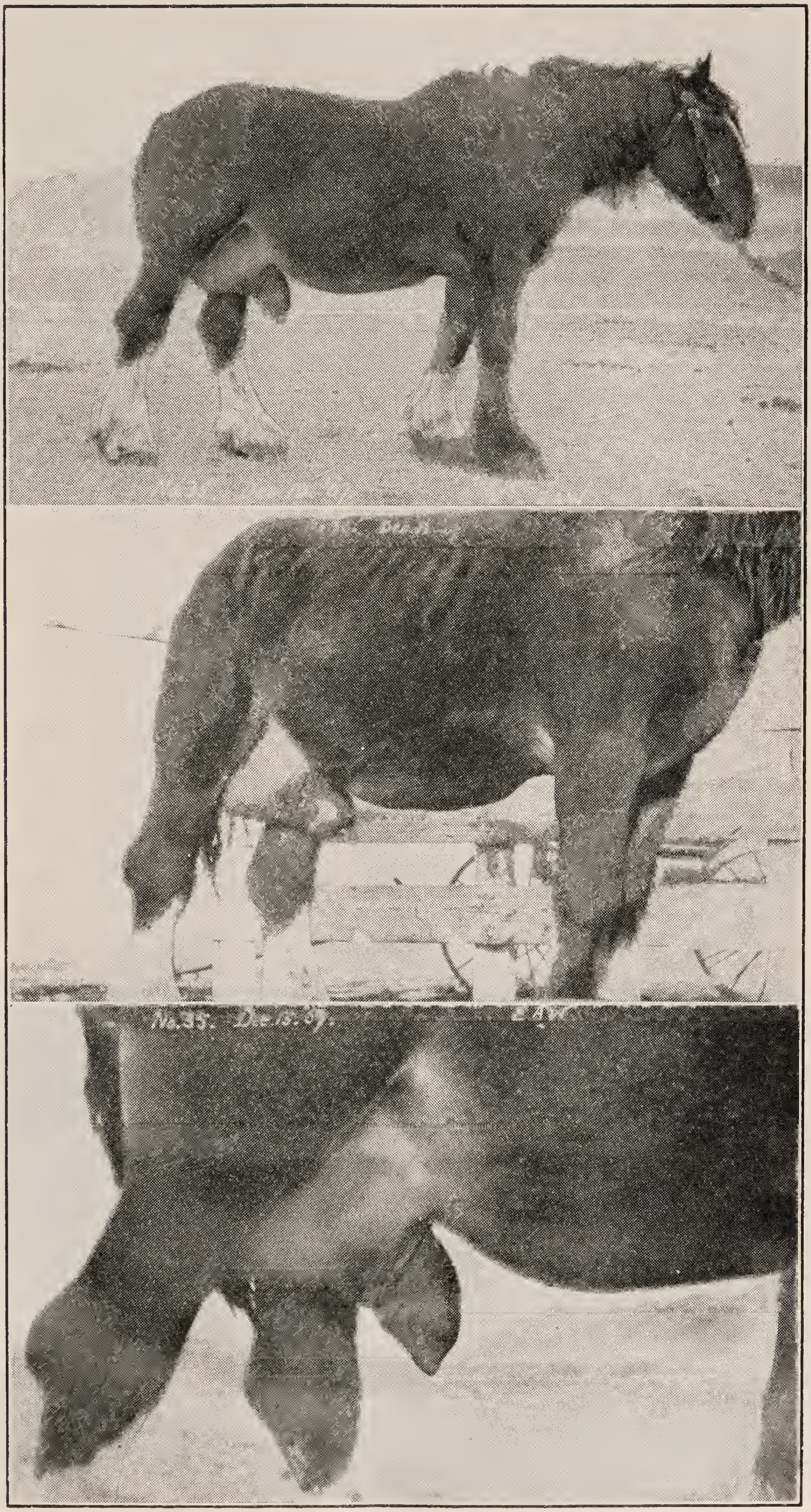
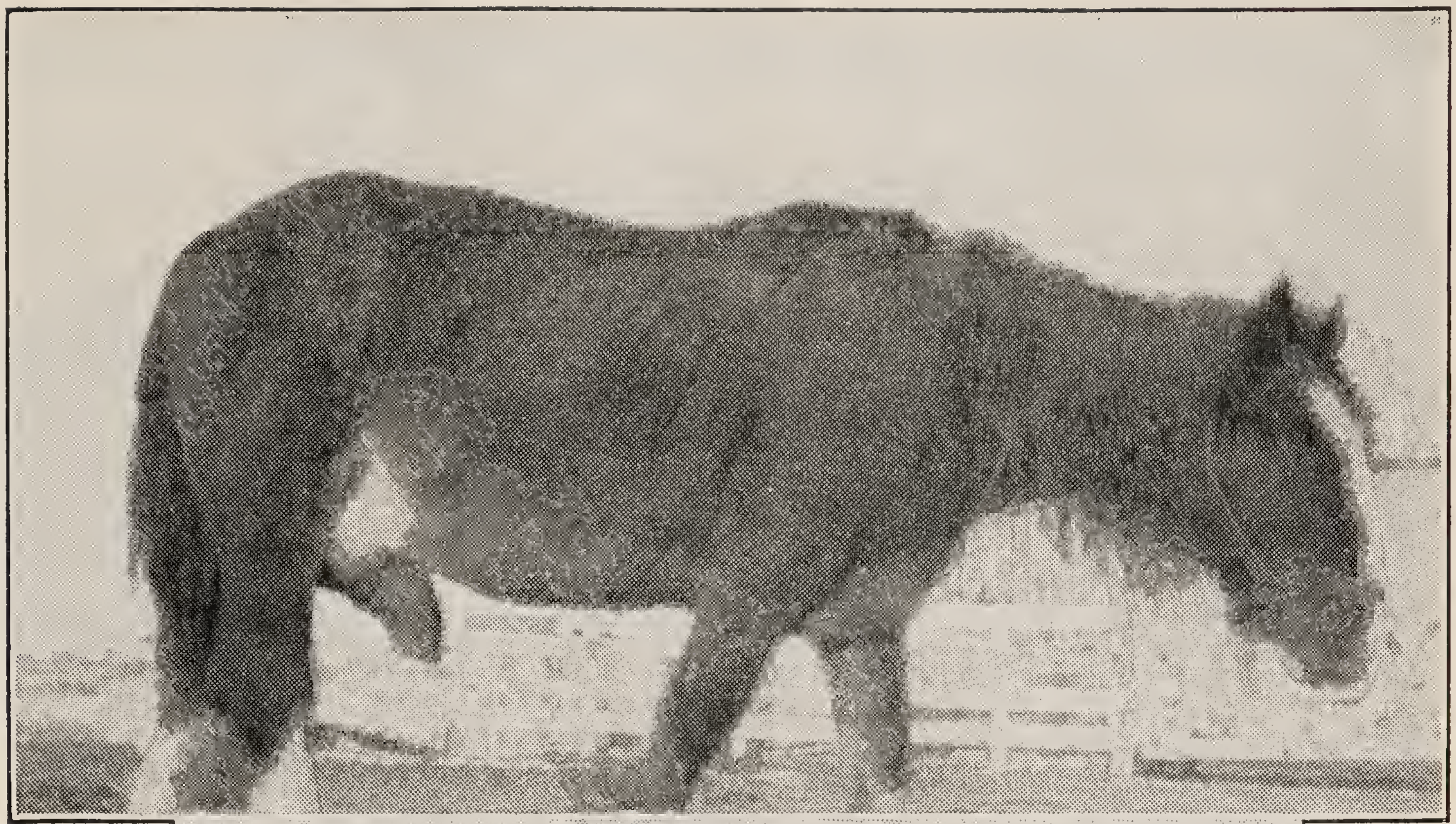
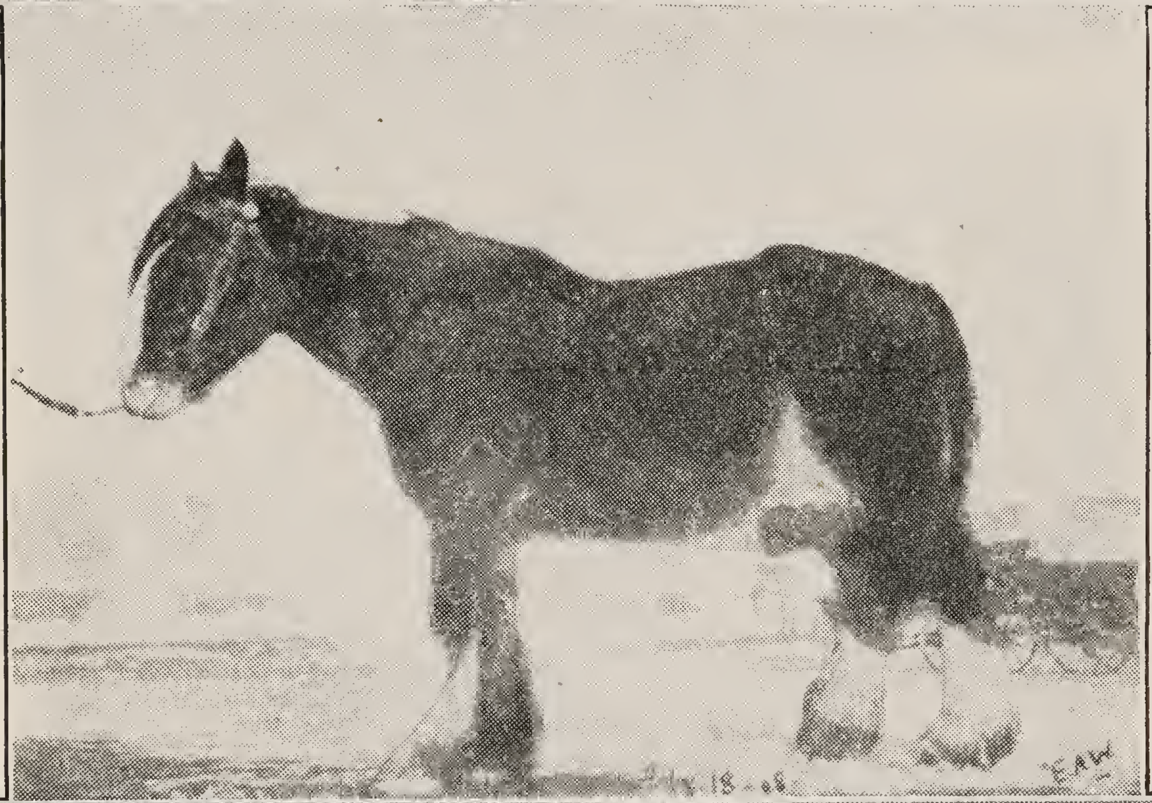


PLATE II.



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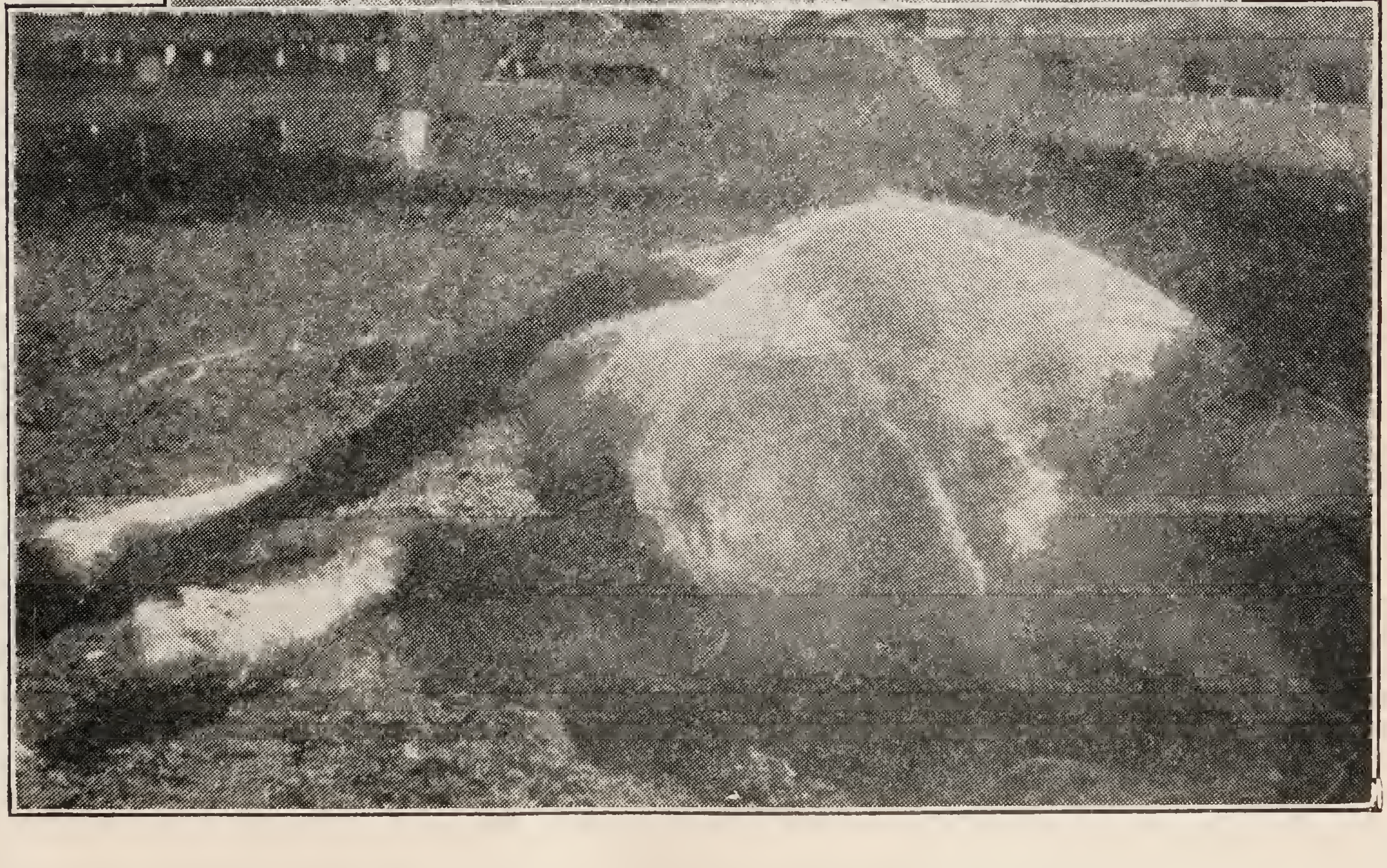

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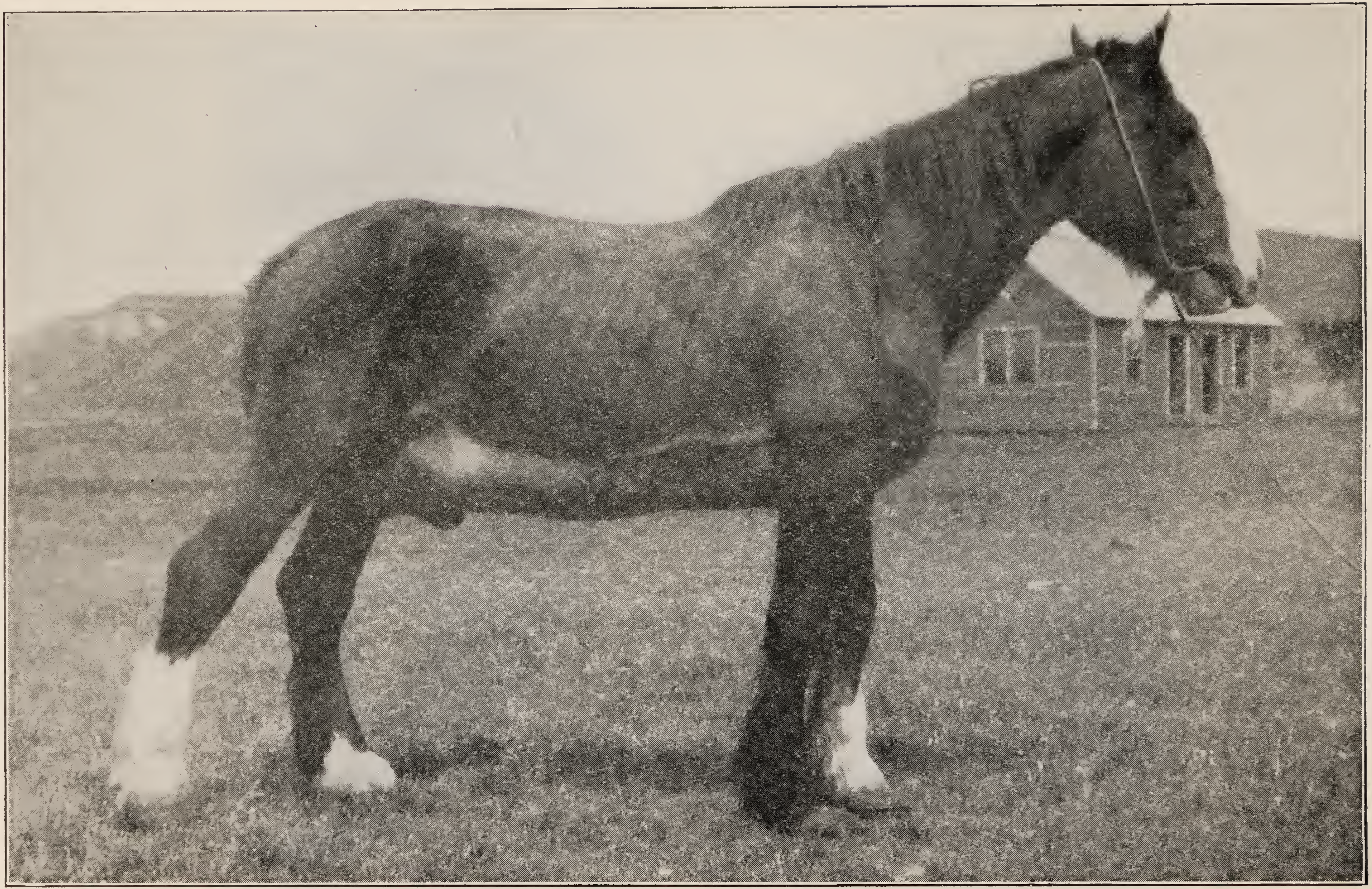


PLATE V.

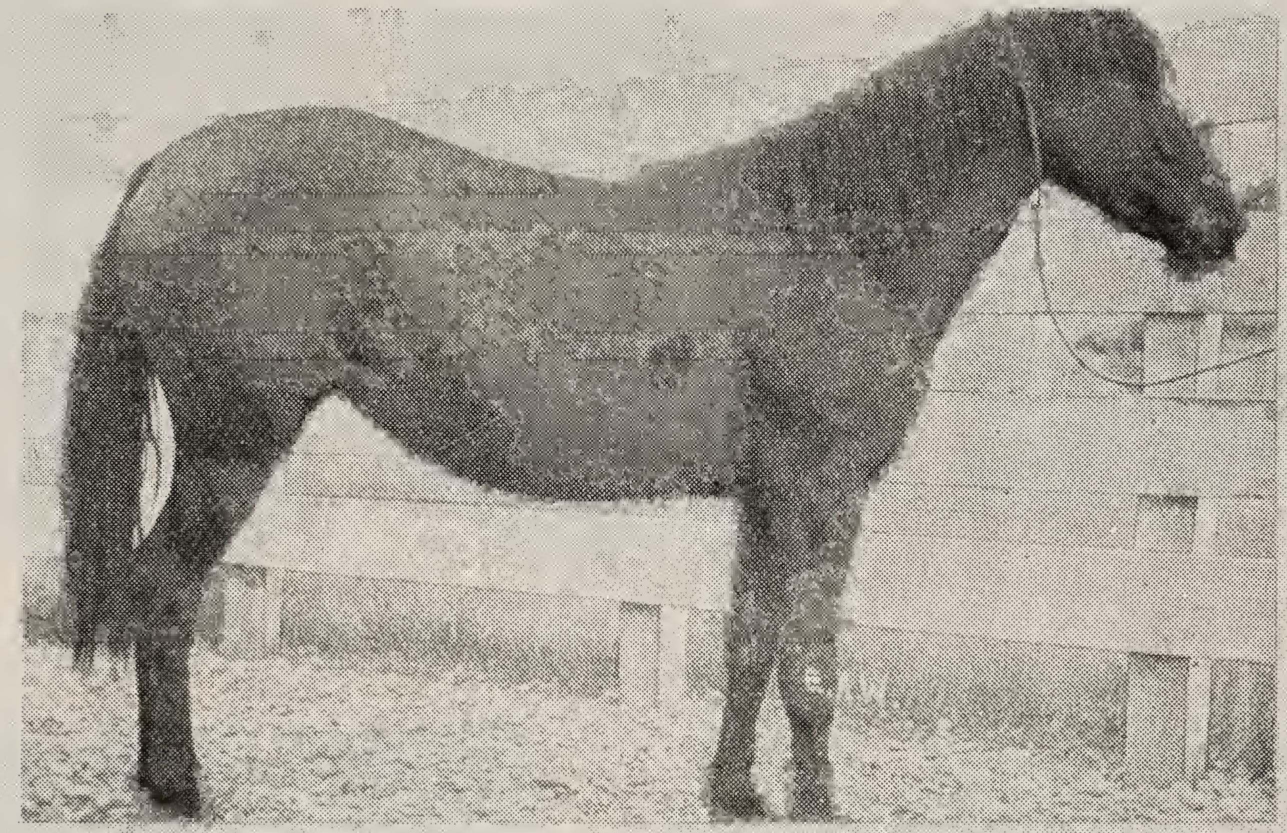


FIG. 1.

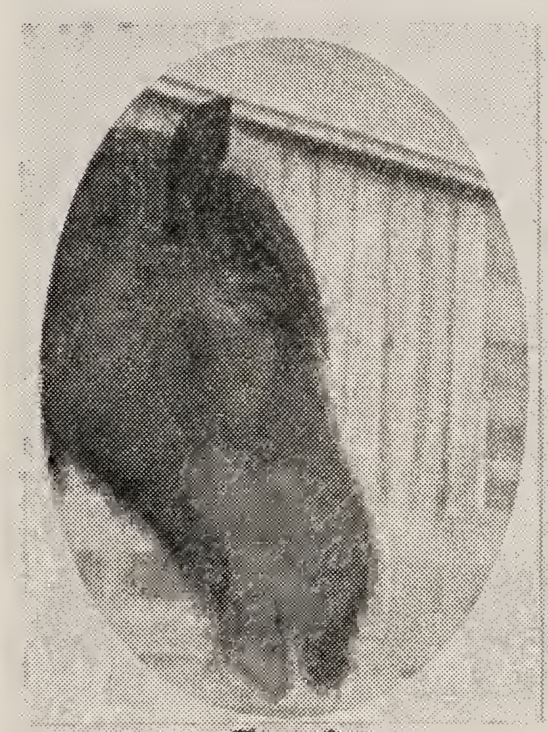


FIG. 2.

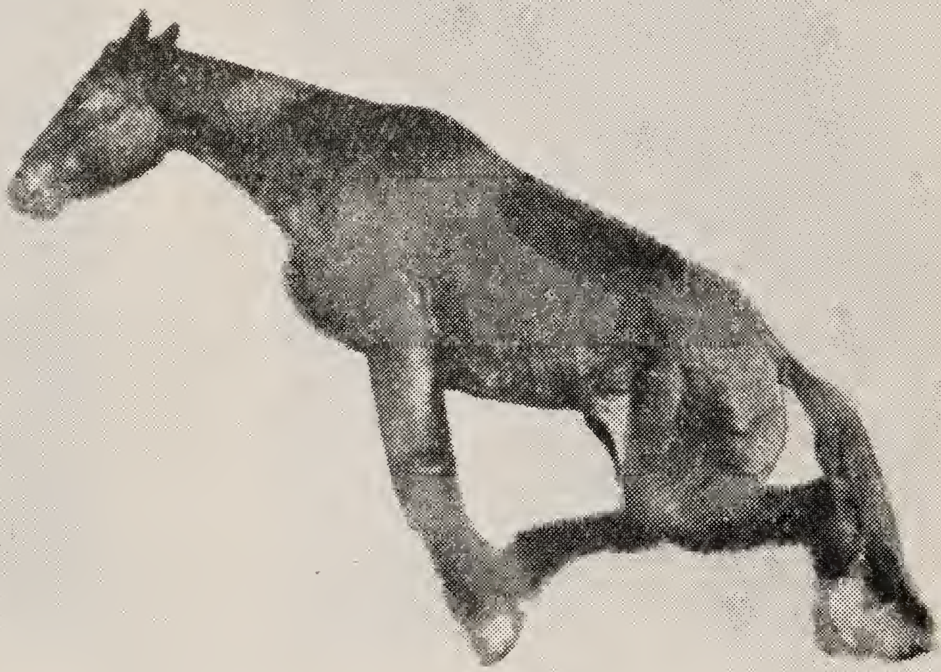


FIG. 3.

PLATE VI.

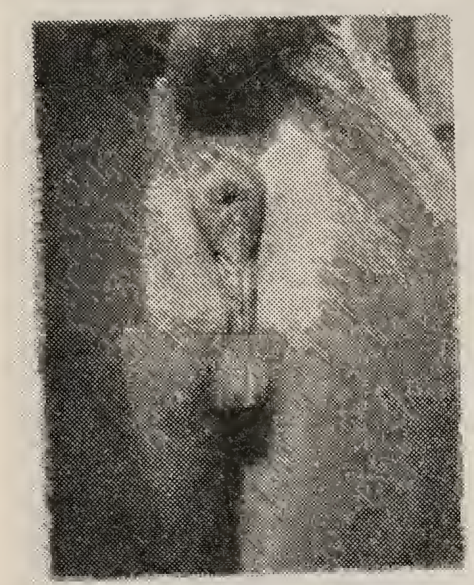


FIG. 1.

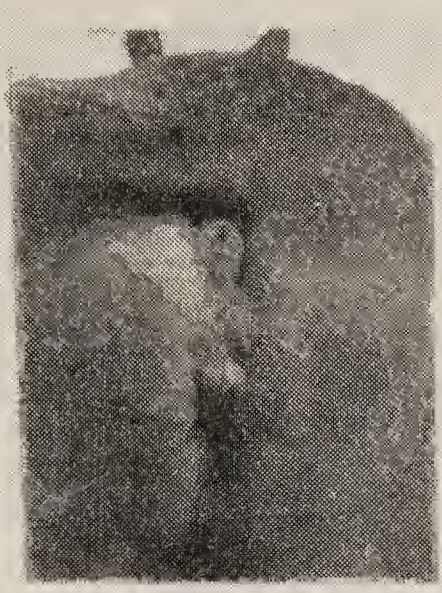


FIG. 2.

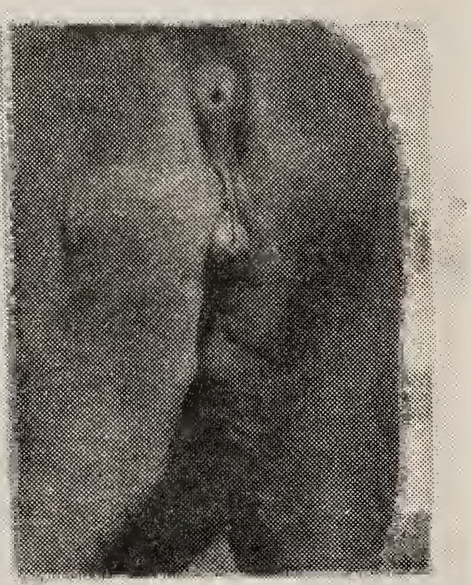


FIG. 3.

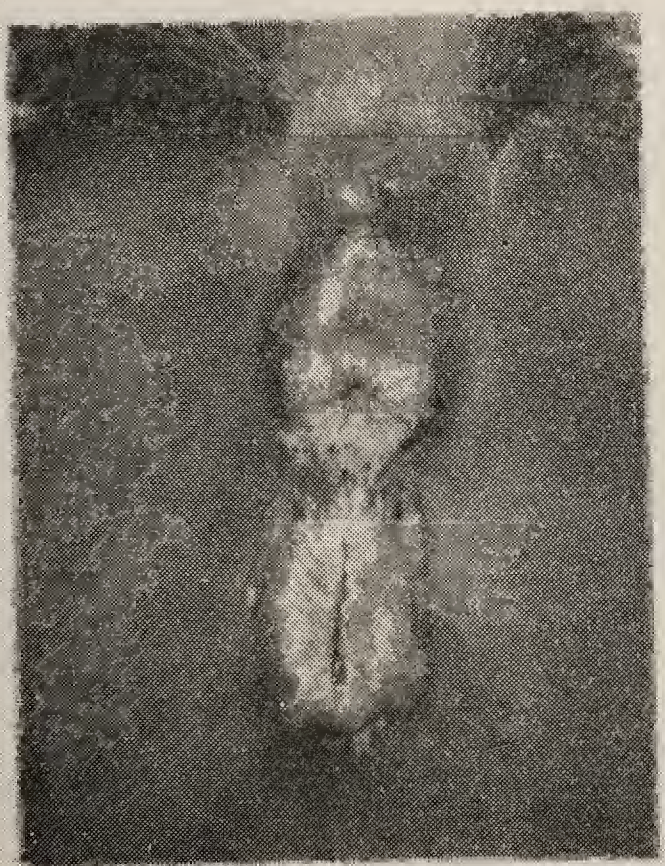


FIG. 4.

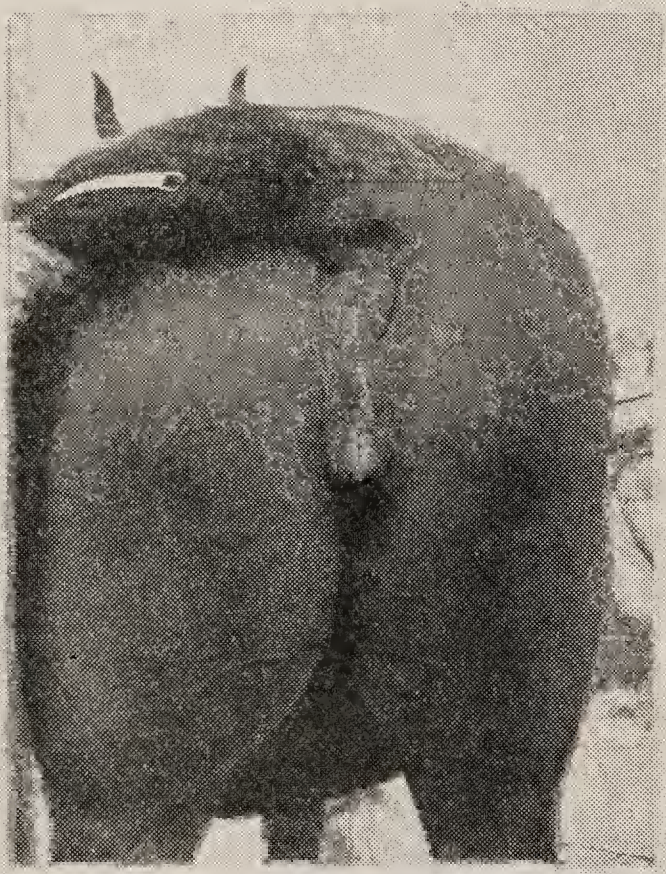


FIG. 5.

Trypanosoma equiperdum.

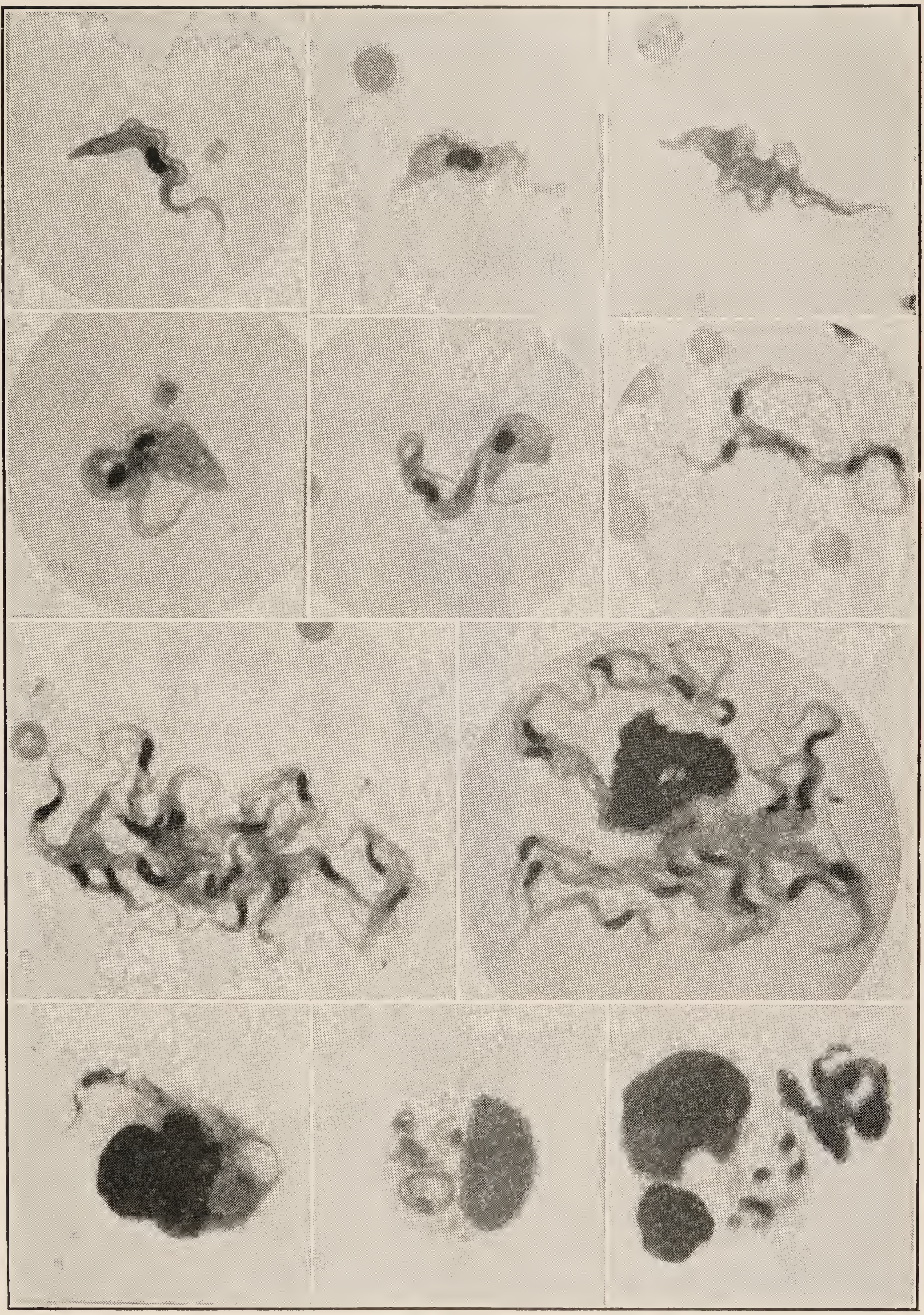


Plate VIII.

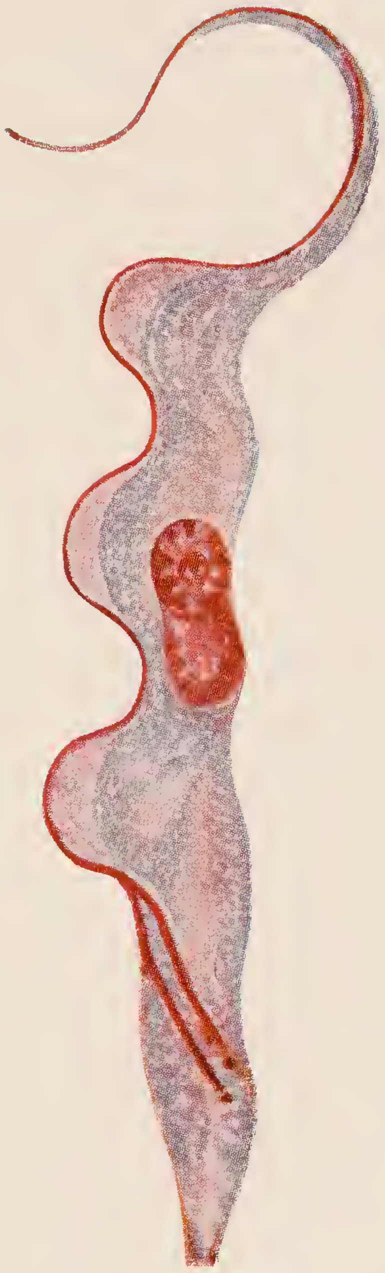
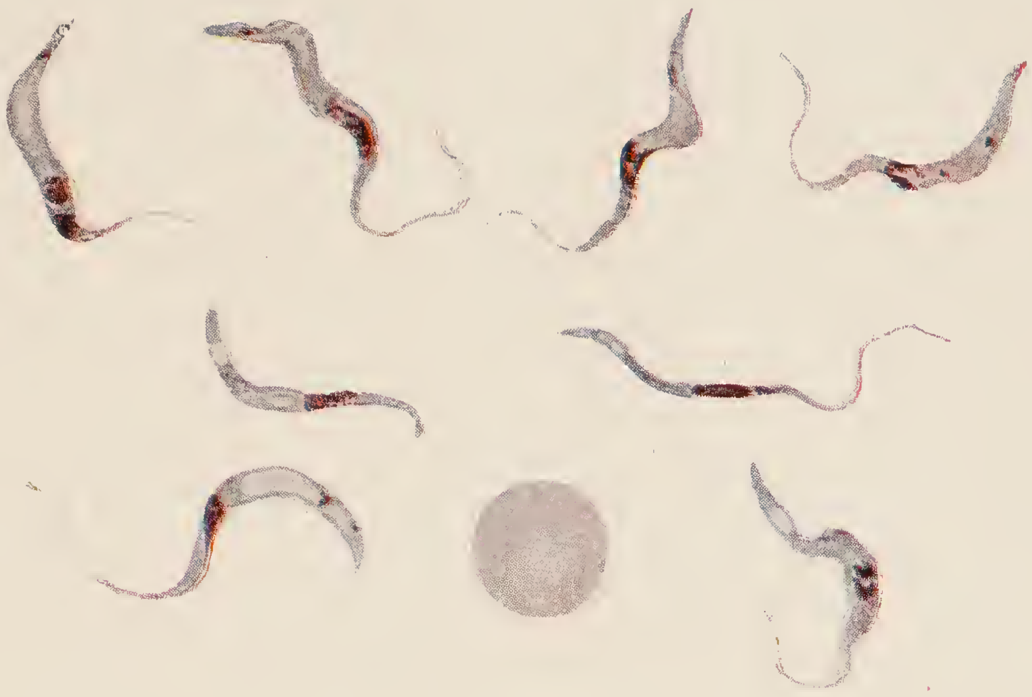
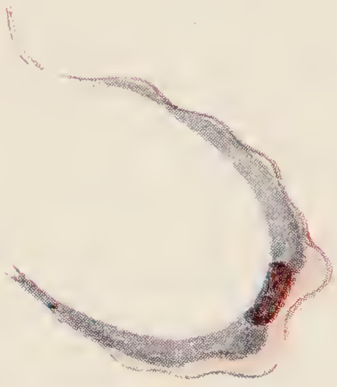
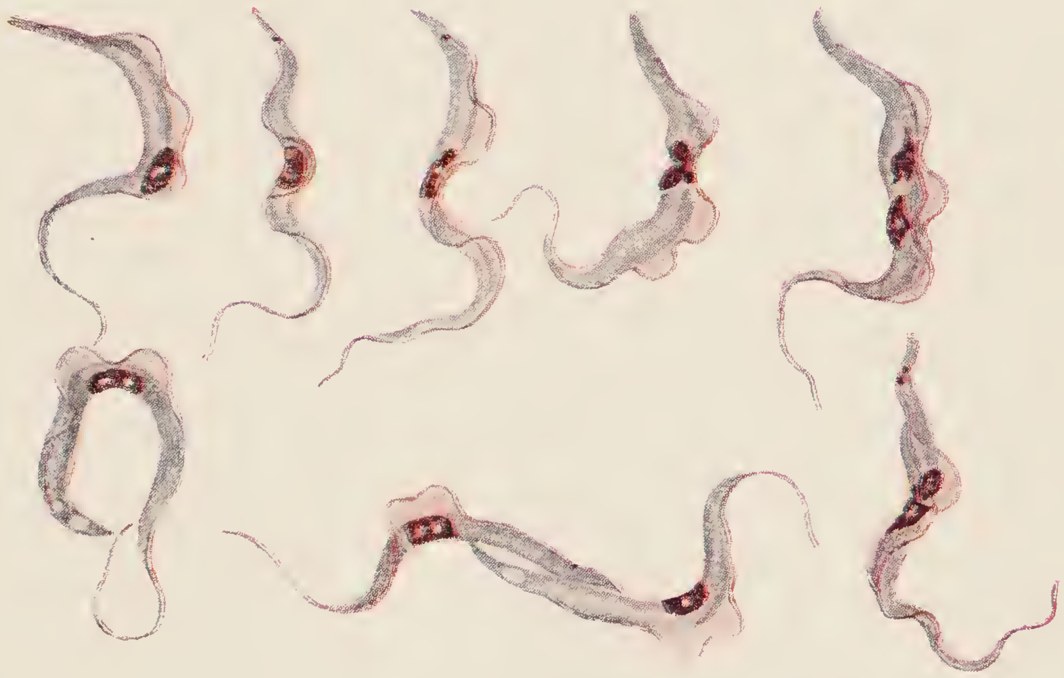


Plate IX







HISTORY-CHART No. 1.

Health of Animals Branch.—Veterinary Research Laboratory, Lethbridge, Alberta.

		1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	
Stallion (31)		Natural infection.	Oedema Destroyed.														
Stallion (33)		Natural infection.	Oedema, anaemia, emaciati paraly	on, sis, death (July 24)													
Stallion (72)		Natural infection.	Oedema, Cachexia, death (Oct. 24)														
Mare (2)		Natural infection.	Tolerant. Covered by Stl. 31.	Normal. Covered by Stl. 72.	Normal. Bred to healthy stallion.	Foaled			Foaled.		C.F. ++	C.F. +++ Foaled. Failing health.	Death (Jan. 25).				Complement Fixation—positive.
Mare (3)		Natural infection.	Tolerant. 3 coverings by Stls. 31 and 33.	Normal. 3 coverings by Stl. 72.	Normal. (Empl	Normal. oyed as a w	Normal. ork mare)	Normal.	Inoculated with trypanosomes from mare 165.	C.F. +++ Oedema, trypanosome periods.	C.F. +++ Failing health.	C.F. +++ Death (Mar. 15).					Complement Fixation—positive.
Mare (19)		Natural infection.	Tolerant. 5 coverings by Stls. 31 and 33.	Normal. 3 coverings by Stl. 72.	(Emplo	yed as fast	driving ma	re for 6 year	s, and as a	brood mare	C.F. − for 4 years..	C.F. −	....	....	....	Died foaling.	Complement Fixation—negative.
Mare (7)		Natural infection.	Tolerant..	Inoc. of trypanosomes from mare 36.	Normal.	Normal. Inoc. of trypanosomes from foal 6f.	Normal.	Normal. Accidentally hurt. Destroyed..									
Mare (9)		Natural infection.	Tolerant. 7 coverings by Stls. 31 and 33.	Normal. Inoc. of trypanosomes from mare 36.	Recurring oedema of vaginal mucosa.	Normal.	(Death from colic.)										
Mare (13)		Natural infection.	Tolerant. 1 covering by Stl. 31.	Normal. Bred to healthy stallion.	Normal. Foaled.	Inoc. of trypanosomes from Foal 12f.	A period of high fever after inoculation.	Normal. (Employe	Normal. d as a work	C.F. +++ mare.)	C.F. +++ Foaled.	C.F. +++ Foaled.	C.F. +++ Foaled.	C.F. +++	C.F. +++ Foaled.	C.F. +++	Complement Fixation—positive.
Mare (17)		Natural infection.	Tolerant. 1 covering by Stl. 33.	Twice inoculated, trypanosomes from mares 9 and 29.	Normal.	Twice inoculated, trypanosomes from foals 1f, 7f.	Normal. (Employed	Normal. as a work	Normal. mare.)	Foaled.	C.F. +	C.F. + Died foaling.					Complement Fixation—positive.
Mare (22)		Natural infection.	Tolerant.. Ovaries removed.	(Normal h	ealth and co	ndition mai	ntained.)		Inoc. of trypanosomes from mare 165. Oedema.	C.F. +++ No symptoms from March to December.	C.F. +++ Inoc. of trypanosomes from inf. rat. Death.						Complement Fixation—positive. Feb., 3 1914.—Inoc. of trypanosomes from an infected rat. May, 10 1914.—Death.
Mare (23)		Natural infection.	(Apparentl	y recovered.	Very good	condition.	No sympto	ms.)	Inoc. of trypaonsomes from mare 165. No reaction.	C.F. +++ Inoc. of trypanosomes from inf. rat. Death.							May 5.—Inoc. of trypanosomes from an infected rat.. Aug., 4 1913.—Death. Complement fixation—positive.
Mare (24)		Natural infection.	Tolerant.. 7 coverings by Stls. 31 and 33.	Normal. Foaled.	Slight Oedema.	Normal. Foaled.	Normal.	Foaled.		C.F. − Foaled.	C.F. −	C.F. − Foaled.	C.F. −	Foaled..		Foaled..	Complement Fixation—negative..
Mare (25)		Natural infection.	Vaginal discharge, emaciation paraplegia.	Slow improvement.	Incoordination. Further improve-	(General inco-or	health and dination of h chronic sym	condition go ind limbs re ptom.)	od, though mains as a	C.F. +++ Inoc. of trypanosomes from a rat. Death.							Complement Fixation—positive. May, 5 1913.—Inoc. of trypanosomes from an infected rat. Sept., 29 1913.—Death.

HISTORY-CHART No. 2.

Health of Animals Branch.—Veterinary Research Laboratory, Lethbridge, Alberta.

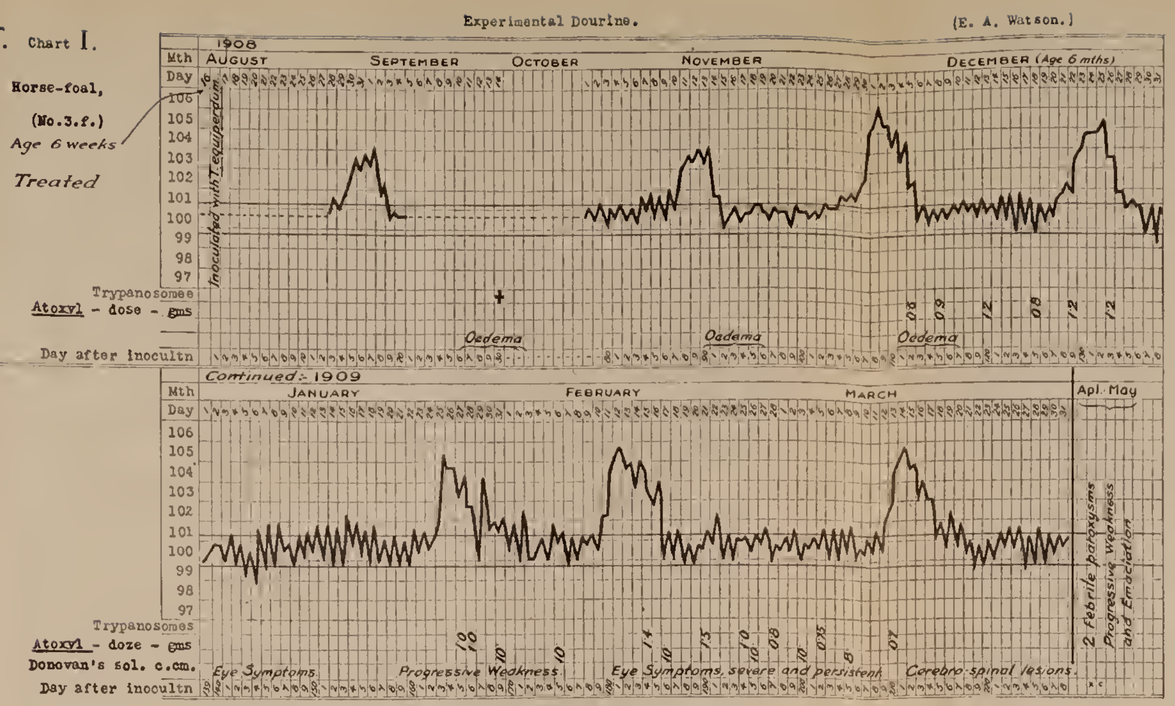
Serial generation and passage of *Trypanosomes equiperdum*.	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	
1st. *Stallion* (35). Natural infection.		Oedema, keratitis, anaemia emaciati paraplegi	on, a, Death.												
2nd. *Mare* (36). Natural infection.	Oe at 7	dema vagin axic paraple plaques.	al m.m., gia,	Paralysi	s. Death.										
3rd. *Foal* (39). Experimental inoculation, trypanosomes from mare 36.		Oed- ema, para- lysis D	eath.												
3rd. *Mare* (41). Experimental inoculation, trypanosomes from mare 36.		Slight oedema vaginal m.m.	29 plaques.	Normal.	Normal.	Normal.	*								*June 12, 1912. Inoc. dourine trypanosomes from guinea-pig. November 4, 1912. Death. (See Table IV.)
3rd. *Foal* (29). Experimental inoculation, trypanosomes from mare 36.		Slight oedema vaginal m.m.	14 plaques.	Normal.	Normal.	Raised healthy foal.	Normal.	C.F. ++	C.F. ++ Foaled.	C.F. +	C.F. + − Foaled.	C.F. − +	C.F. − +	C.F. − + Foaled.	Complement Fixation,—Weak .... positive reactions.
4th. *Filly* (69). Experimental inoculation, trypanosomes from foal 29.			Re oe lab	curring dema of iia pudendi.	Normal.	Normal.	Normal.		C.F. −	C.F. − Foaled.	C.F. − Foaled.				Complement Fixation,—negative.
4th. *Foal* (3*f*). Experimental inoculation, trypanosomes from foal 29.	(See Tempe Charts I,	rature Ia, Ib, Ic.)	O fe oc sy	edema, ver paroxys ular and par mptoms	ms, aplegic	Recovering.	Absence of symptoms.	*							*Feb. 14, 1913. Inoc. dourine trypanosomes from an infected rat. Mar. 15, 1913. Death. (See Table IV.)
4th. *Foal* (5*f*). Experimental inoculation, trypanosomes from foal 29.	(See Tempe Charts	rature II, IIa,IIb.)	Re oe fe 3 pa	curring dema l.p., ver paroxys plaques, raplegic sy	ms, mptoms.	No symptoms. Apparent recovery.	*								*June 12, 1912. Inoc. dourine trypanosomes from an infected guineapig. Sept. 10, 1912. Death. (See Table IV.)
5th. *Foal* (1*f*). Experimental inoculation trypanosomes from foal 5f.	(See Tempe	rature Cha	rt III.)	Recurring oedema; fever paroxysms	Slight paraplegic symptoms.	Apparent recovery.	*								*June 12, 1912. Inoc. dourine trypanosomes from an infected guineapig. 4 Sept., 1912. Death. (See Table Iv.)
6th. *Foal* (6*f*). Experimental inoculation, trypanosomes from foal 1f.	(See Tempe	rature Cha	rt IV.)	Recurrin ma, remi fever, de	g oede- ttent bility D	eath.									
7th. *Foal* (7*f*). Experimental inoculation, trypanosomes from foal 6f.				Recur ma, re fever,	ring oede- mittent urticaria	No sympt Apparent after 3 inje arsenophe	oms. recovery. ctions of nylglycin.		C.F. −	C.F. − Foaled.				Foaled.	Complement Fixation,—negative.
8th. *Foal* (8*f*). Experimental inoculation, trypanosomes from foal 7f.				Fev Dea 41	er. th. days.										
9th. *Foal* (11*f*). Experimental inoculation, trypanosomes from foal 8f.	(See Tempe	rature Cha	rt IX.)	Fe De 51	ver. ath. days.										
10th. *Foal* (12*f*). Experimental inoculation, trypanosomes from foal 11f.	(See Tempe	rature Cha	rt X.	F D 5	ever. eath. 1 days.										

HISTORY-CHART No. 3.

Health of Animals Branch.—Veterinary Research Laboratory, Lethbridge, Alberta.

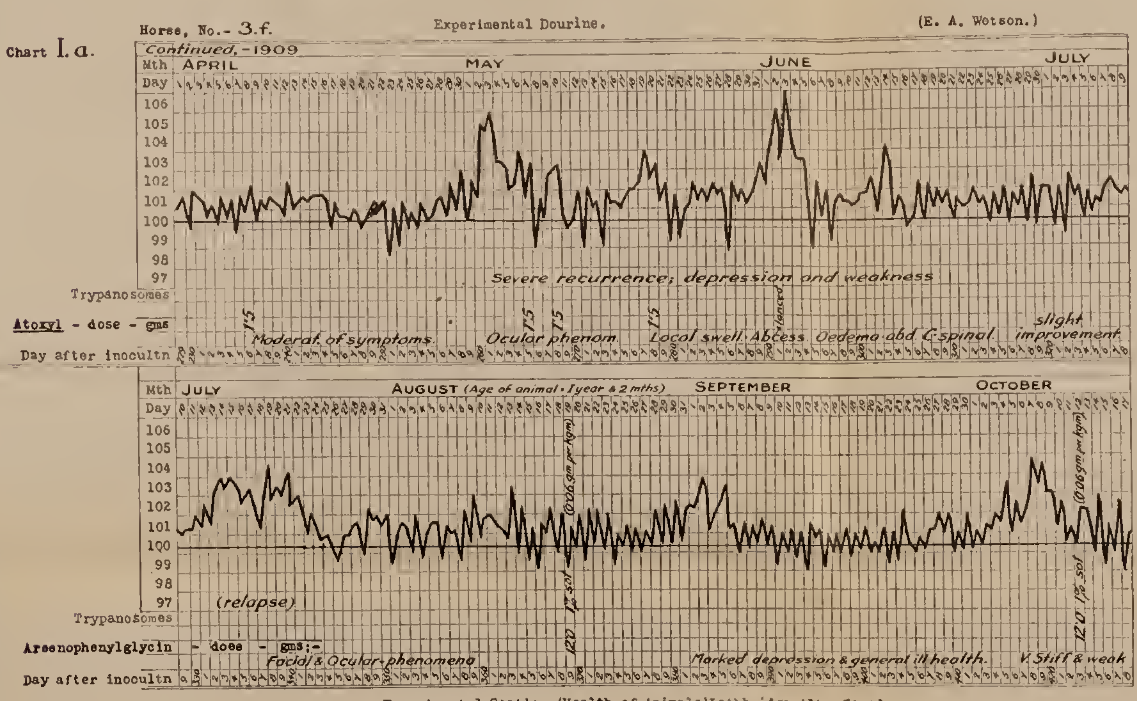
	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	
Mare (*26*) (2 yr. old). Experimental inoculations of blood from stallion 33. Nov. 21 to Dec. 3, 1906.		Absence of definite symptoms.	1 plaque (Aug. 22) Trypanosomes detected.	Normal.	Foaled.			Foaled.	C.F. – Foaled.	C.F. – Foaled. Ill health.	Died.				Complement Fixation,—negative.
Gelding (*43*) (2 yr. old). Experimental transfusion of 600 c.c. of blood from mare 36. Apl. 24, 1907.		Intermit'nt paraplegic symptoms.	Normal.	Normal.	(An excell	ent riding	horse.)	Died, from influenza.							
Mare (*66*) (3 yr. old). 4 experimental inoculations of trypanosomes from mares 29 and 41 and from foal 7f. Apl. 21, 1908—May 21, 1909.			Oedema of lab. pudendi 8 plaques. Trypanoso	1 plaque. mes present.	Normal. (Made a	good saddle	mare for 4	years.)	C.F. +++ Ill health. Paralysis. Death (16 Sept.)						Complement Fixation,—positive. Relapse of dourine and death after 4 years of tolerance and normal health.
Mare (*67*) (3 yr. old). 3 experimental inoculations of trypanosomes from mares 29, 41 and 82. Feb. 3, Aug. 27'08.				Oedematos swellings under abdomen.	Normal.	Foaled.			C.F. – Foaled.	C.F. – Foaled.	Foaled.			Destroyed (Dec.)	Complement Fixation,—negative.
Mare (*69*) (3 yr. old). 1 experimental inoculation of trypanosomes from mare 29. Aug. 27, 1908.			Recurrin of labia rich in tryp	g oedema pudendi, anosomes.	Normal. recovery.	(Made a g	ood saddle	mare for 4	C.F. – years.)	C.F. – Foaled.	Foaled.			Foaled.	Complement Fixation,=negative.
Mare (*70*) (2 yr. old). 2 experimental inoculations of trypanosomes from mares 29 and 41. Oct. 4, 1907.		Recurring rich in try	oedemas, panosomes.	Normal. recovery.	Foaled.		Foaled.		C.F. – Foaled.	C.F. – Foaled.	Foaled.			Foaled.	Complement Fixation,—negative.
Mare (*71*) (3 yr. old). Experimental inoculation of 100 c.c. of blood from mare 29. Aug. 29, 1908.			Absence of definite symptoms.	Normal.	Foaled.	Foaled.			C.F. –	C.F. –				Normal.	Complement Fixation,—negative.
Mare (*48*) (5 yr. old). Experimental inoculations after recovery from a natural infection from stallion 35.		Tolerant. Slight oedema of vaginal mucosa.	Normal. Inoc. of trypanosomes from foal 3f.	Normal. Inoc. of trypanosomes from foal 1.f	Normal. (Employ	ed as a fast	driving ma	C.F. – re or 5 yea	C.F. – rs.)	C.F. – Foaled.	Foaled.	Died in foaling.			Complement Fixation,—negative. Immunity acquired.
Mare (*52*) (5 yr. old). Natural infection by stallion 35.		Tolerant. Slight oedema and paraplegic symptoms.	Normal. (Employe	d as a sadd	le mare for	10 years....	....	....	C.F. –	C.F. –	....	....		Destroyed (Dec.)	Complement Fixation,—negative.
Mare (*75*) (7 yr. old). Natural infection.		Oedemas mucosa an pudendi, trypano	of vaginal d of labia rich in somes.	Normal. recovery.	(Normal h	ealth maint	ained.)	C.F. ++	C.F. ++ Destroyed.						Complement Fixation,—positive.
Mare (*82*) (7 yr. old). Natural infection.		Recurring mucosa, la under abd frequ	oedema of bia pudendi omen. Tryp ently detec	vaginal and anosomes ted.	Normal. recovery.	(Normal	health.)			C.F. ++	C.F. ++	Destroyed.			Complement Fixation,—positive.
Mare (*180*) (5 yr. old). Natural infection (1913) by stallion 182.									C.F. +++ Plaques. Inco-ordination.	C. F.++ Foaled. (Mule)	C.F. +++ Fair condition.	C.F. +++ Paraplegic symptoms. Emaciation.	Died.		Complement Fixation,—positive.
Mare (*181*) (4 yr. old). Natural infection (1913) by stallion 182.									C.F. +++ Paraplegic	C.F. +++ symptoms. Died. (Aug. 15)					Complement Fixation,—positive.
Stallion (*182*) (3 yr. old). Natural infection (1913).								Plaques an Trypan pres	C.F. +++ d oedema. osomes ent.	C.F. +++ Castrated.	C.F. +++ Worked.	C.F. +++ Failing health.	C.F. +++ Decline and death.		Complement Fixation,—positive.

T. Chart I.



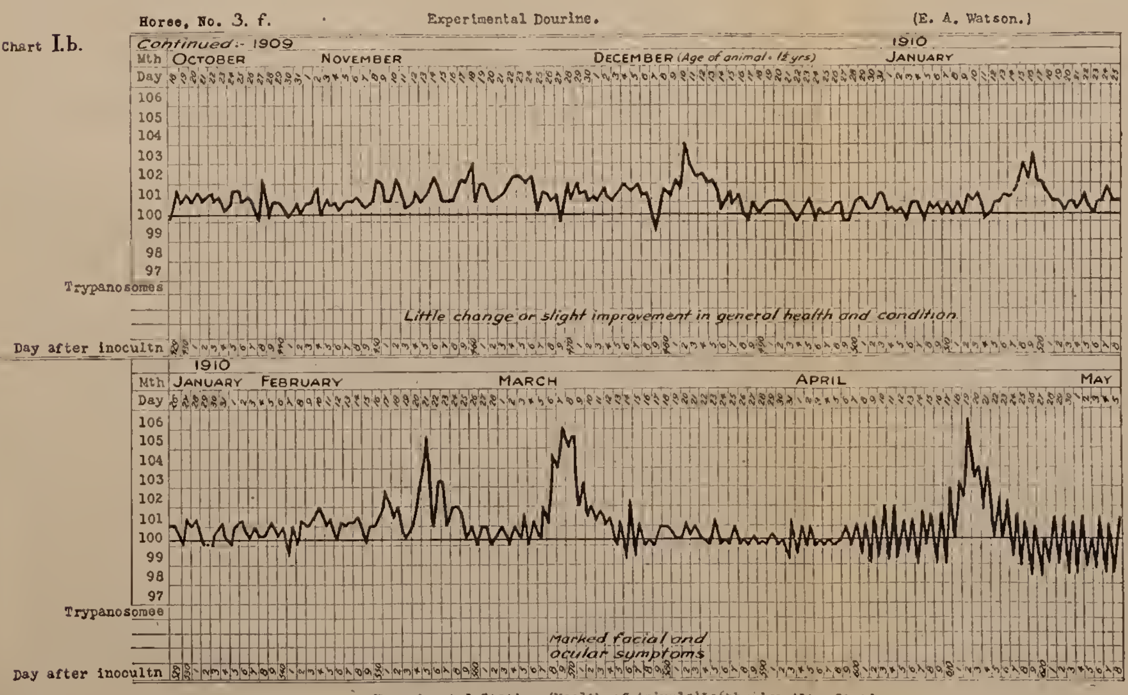
Experimental Station (Health of Animals) Lethbridge, Alta, Canada

Chart I. a.



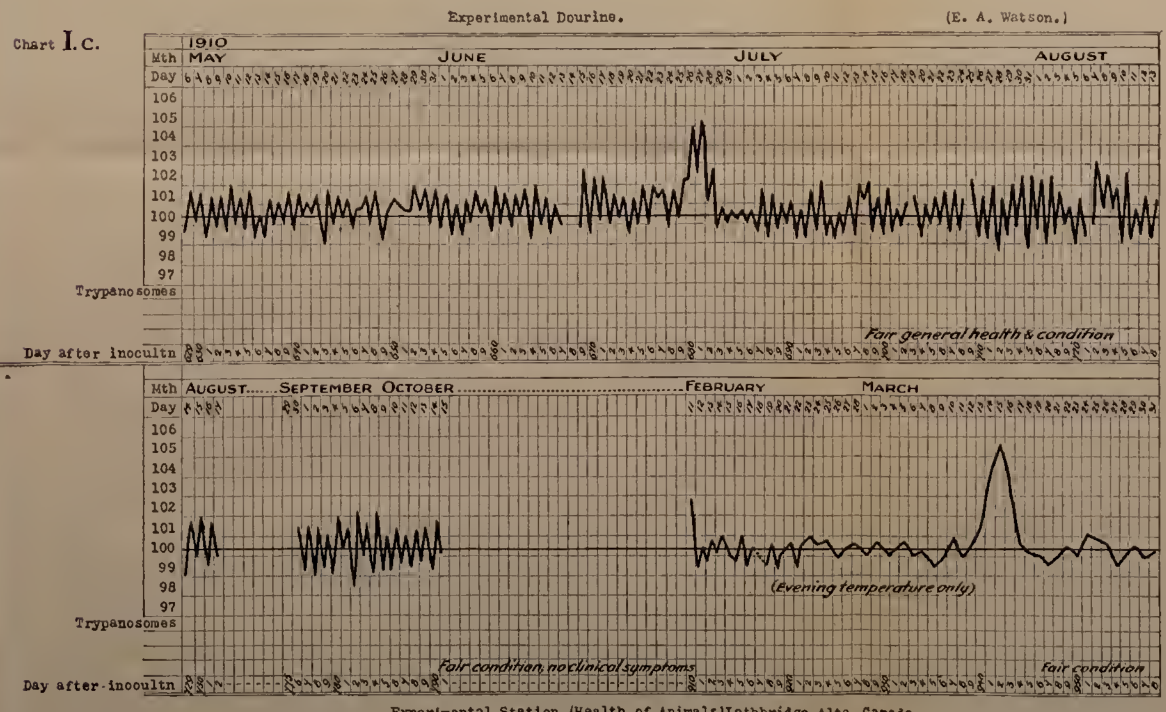
Experimental Station (Health of Animals) Lethbridge, Alta, Canada

Chart I.b.



Experimental Station (Health of Animals) Lethbridge, Alta, Canada

Chart I. c.



Experimental Station (Health of Animals) Lethbridge, Alta, Canada

(See History-Chart No. 2.)

T. Chart II.

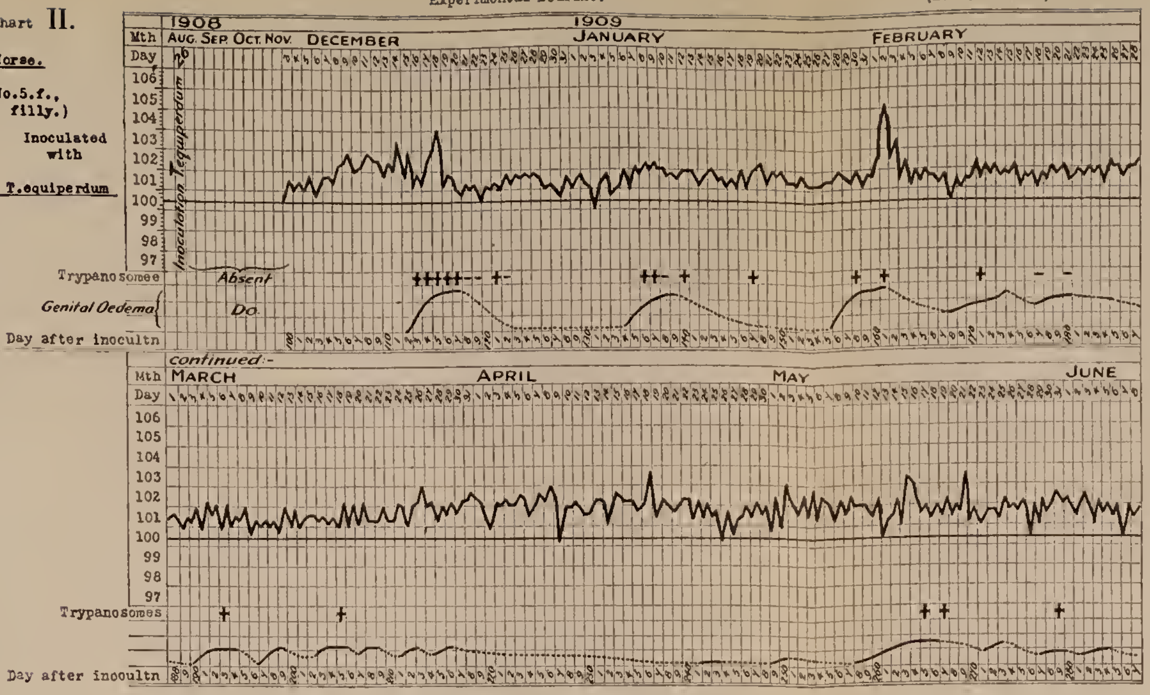
Experimental Dourine. (E. A. Watson.)

Horse.

(No.5.f., filly.)

Inoculated with

T.equiperdum



Experimental Station (Health of Animals) Lethbridge, Alta, Canada

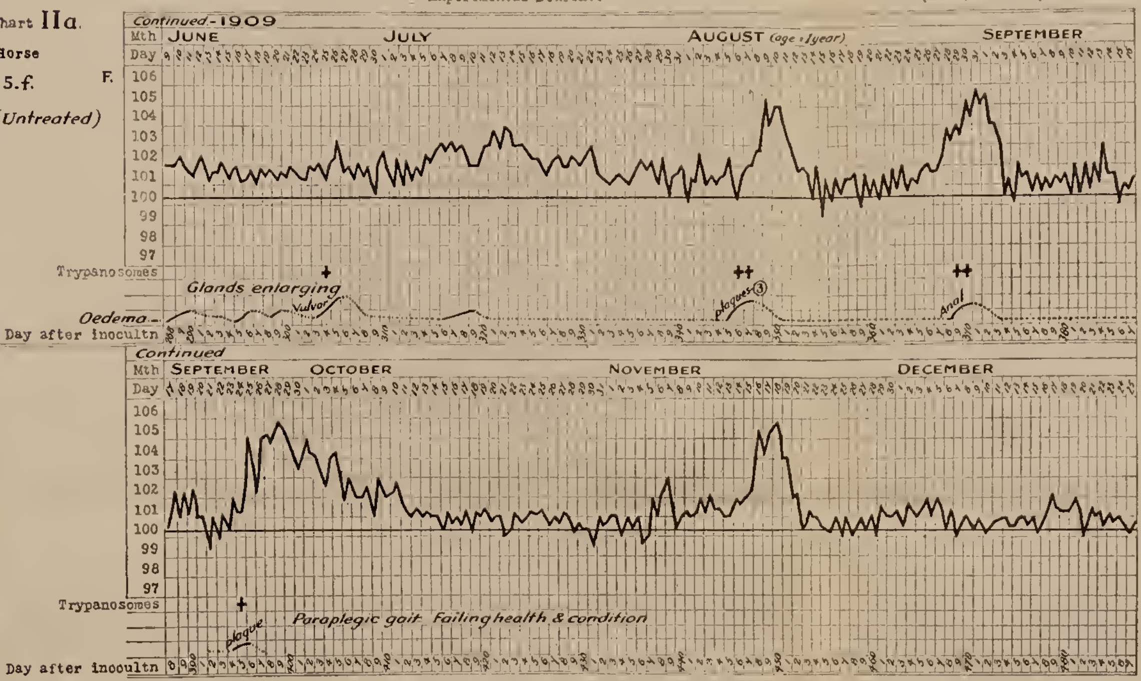
Chart IIa.

Experimental Dourine. (E. A. Watson.)

Horse

No. 5.f. F.

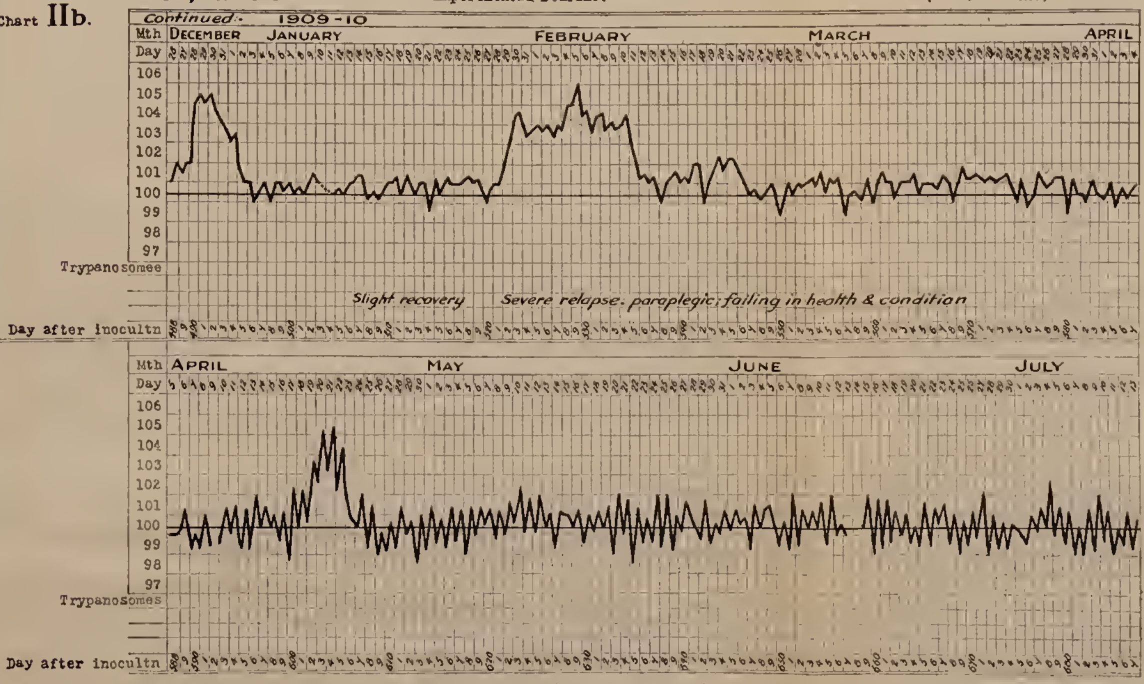
(Untreated)



Experimental Station (Health of Animals) Lethbridge, Alta, Canada

Chart IIb.

Horse, No.- 5.f. Experimental Dourine. (E. A. Watson.)

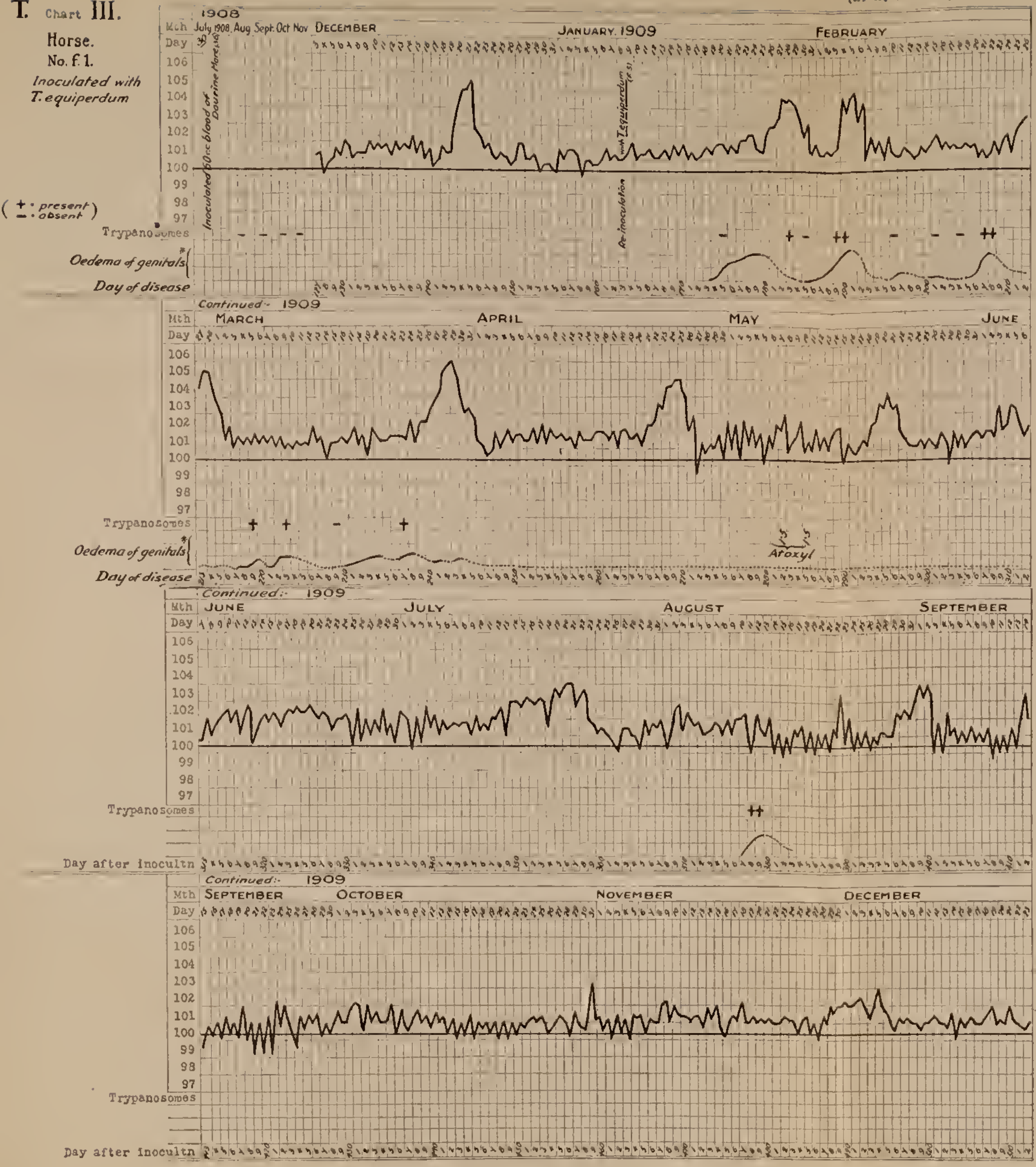


Experimental Station (Health of Animals) Lethbridge, Alta, Canada

(See History-Chart No. 2.)

Dourine. (E. A. Watson.)

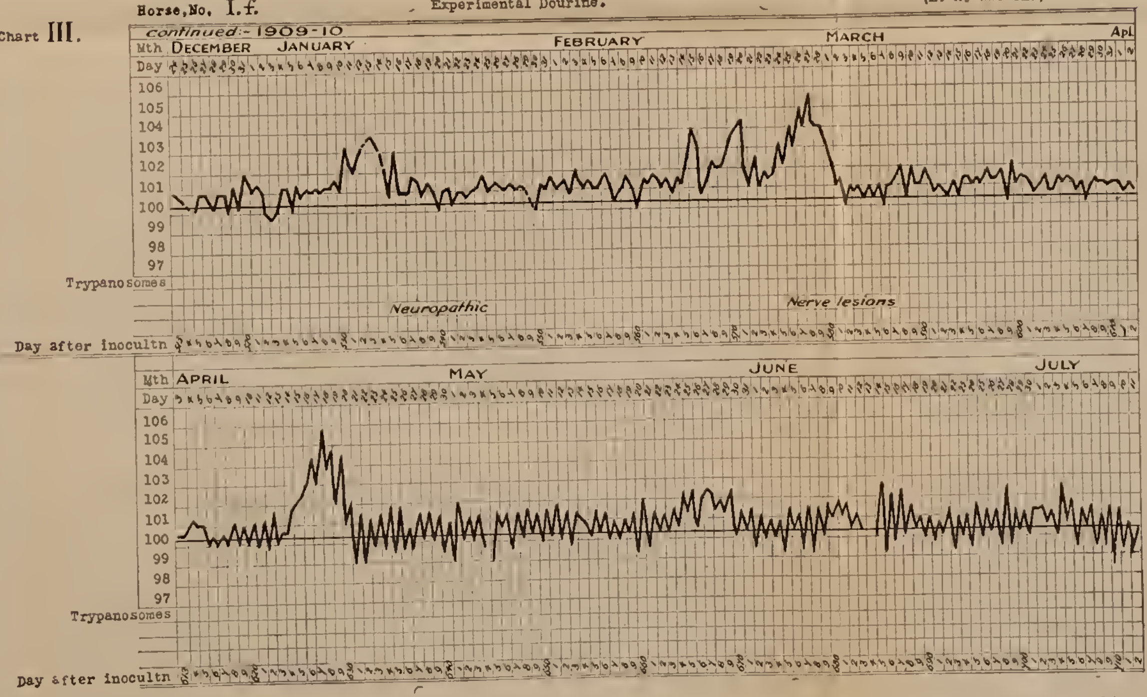
T. Chart III.



Experimental Station (Health of Animals) Lethbridge, Alta, Canada

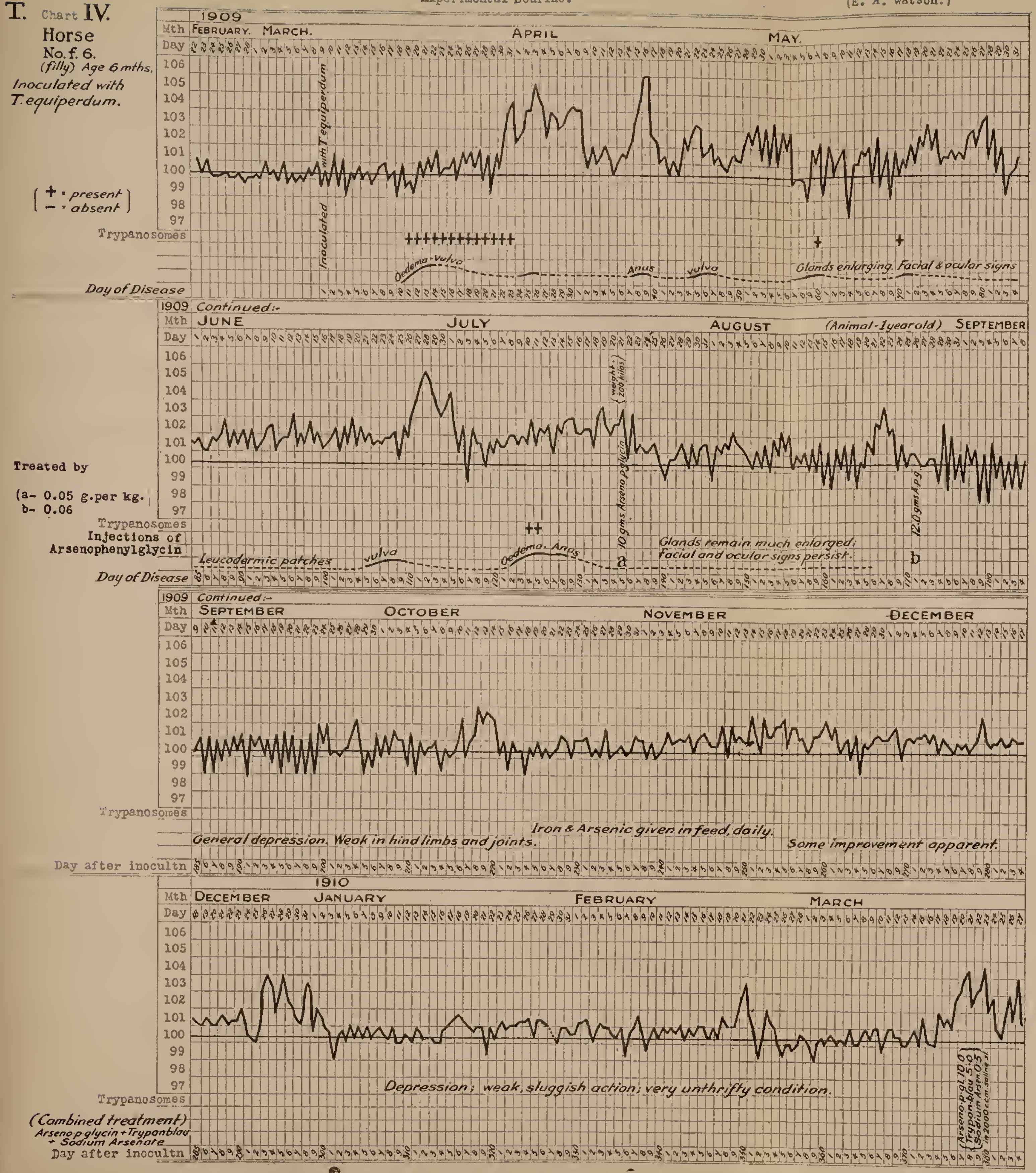
Horse, No. I.f. Experimental Dourine. (E. A. Watson.)

T. Chart III.

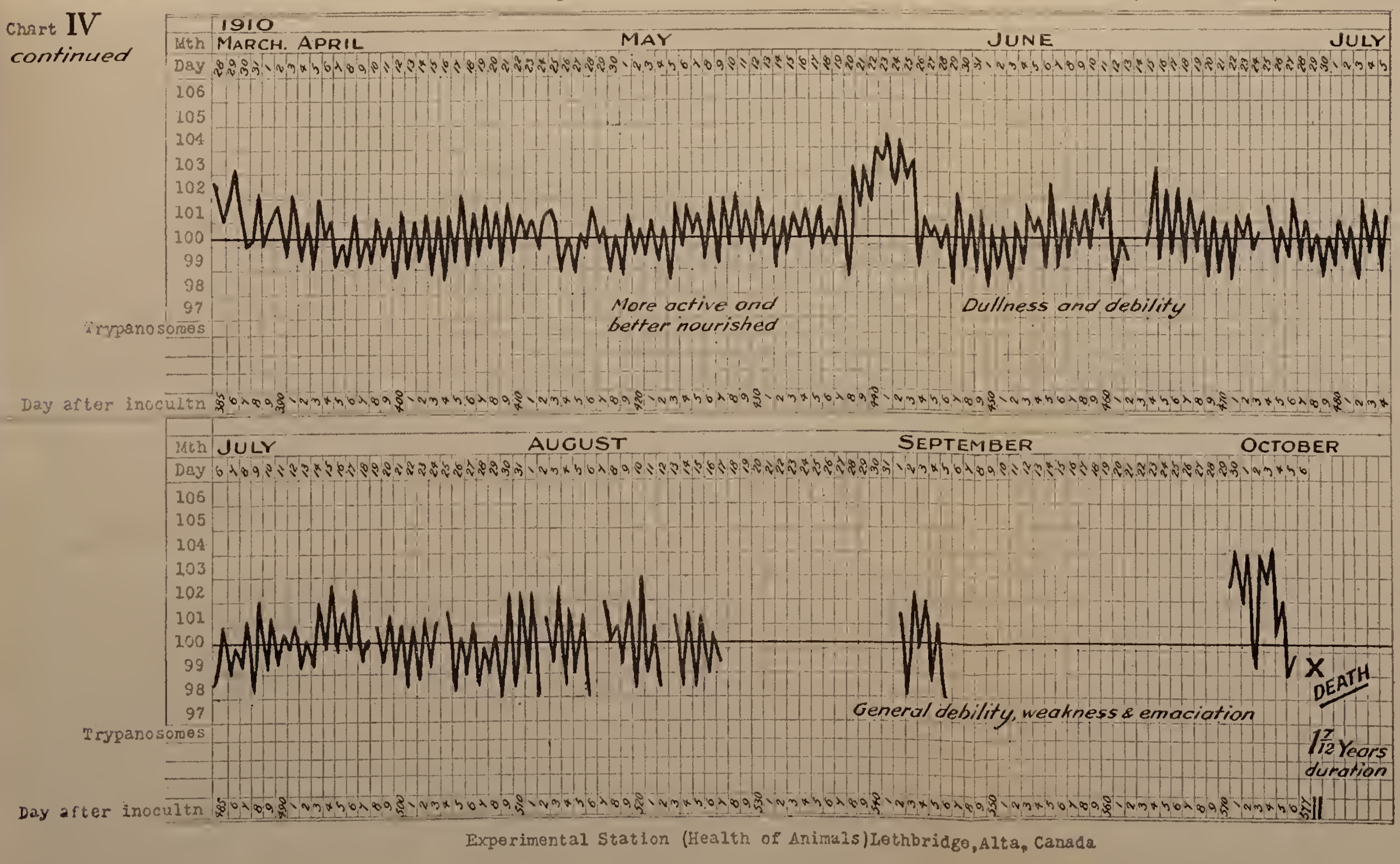


(See History-Chart No. 2.)

Experimental Dourine. (E. A. Watson.)



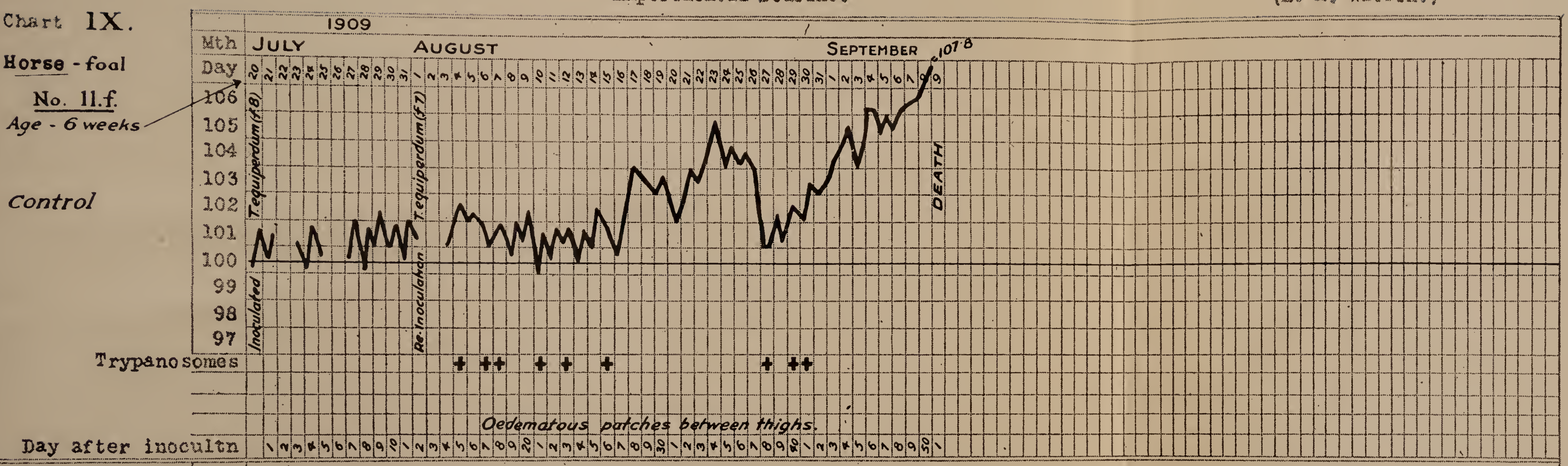
Experimental Dourine. (E. A. Watson.)



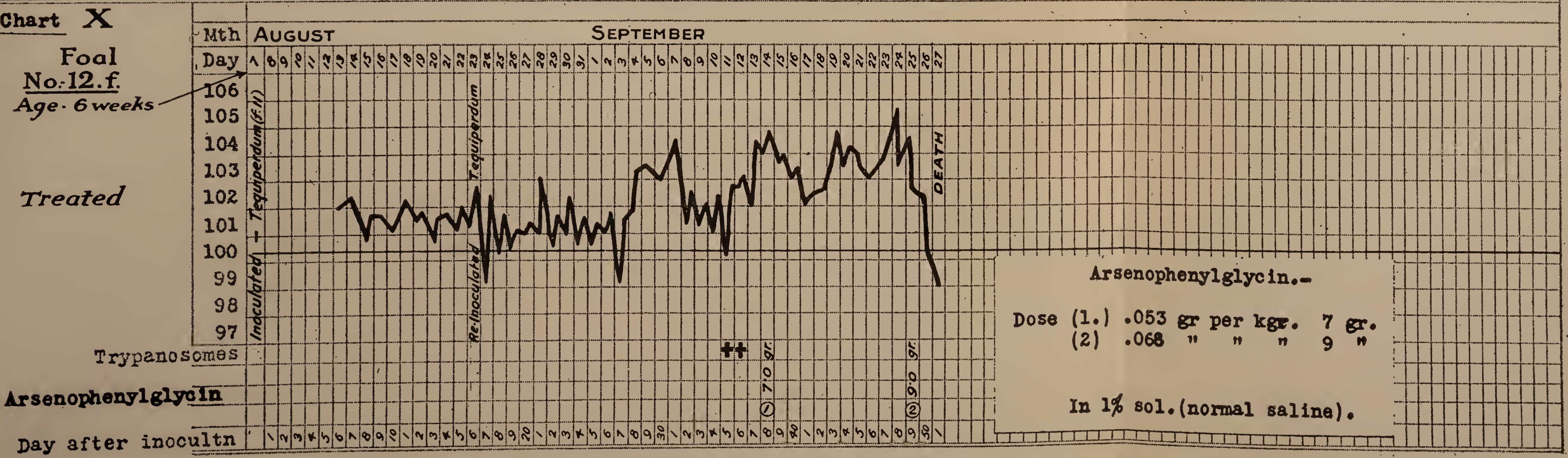
Experimental Station (Health of Animals) Lethbridge, Alta, Canada

Experimental Dourine. (E. A. Watson.)

T. Chart IX.



T **Chart** **X**



Experimental Station (Health of Animals) Lethbridge, Alta, Canada

XXXVII.

ART AND EPIGRAM REGARDING SCIENCE AND MEDICINE IN RELATION TO DEATH

Being the Reprint of a Communication from the PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE (Section of the History of Medicine), 1914, Vol. VII, pp. 192—217

Together with an Addition on

EPIGRAM AND ART IN RELATION TO THE EXCESSIVE FEAR OF DEATH

BY

F. PARKES WEBER, M.D., F.S.A.

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ART AND EPIGRAM REGARDING SCIENCE AND MEDICINE IN RELATION TO DEATH.

"NEC SILET MORS" was the motto of the Pathological Society of London on its foundation in 1846—a motto which might fitly be applied to much recent scientific work carried out in connexion with Egyptian mummies, &c. Death, however much grief it causes, will often, if properly questioned, teach us something about the cause, course, and prevention of a disease, which may be helpful for the preservation of human life and health. The Cheselden and Bristowe prize medals of St. Thomas's Hospital, London, bear to some extent on this aspect of death, especially the former and more beautiful of the two, on which is the inscription, "Mors vivis salus." A medal of J. B. Morgagni (by T. Mercandetti, of Rome) has the inscription, "Saluti scientia," referring to his necropsy work.

The equally beautiful Fothergillian medal of the Royal Humane Society, London, may likewise be mentioned in this connexion, since a specimen struck in gold, now in the British Museum, was awarded in 1845 to Sir John Erichsen for his "Experimental Enquiry into the Pathology and Treatment of Asphyxia." This medal, like the above-mentioned Cheselden medal, was the work of William Wyon, R.A. (1795-1851).

Here also properly belong all medals commemorating life-saving scientific discoveries. I will only instance those made by Augustin Dupré (the foremost medallist of the great French Revolution), relating to Benjamin Franklin's discovery of lightning conductors, with the famous hexameter epigram: "Eripuit coelo fulmen sceptrumque tyrannis" ("He snatched the thunderbolt from heaven and the sceptre from tyrants"). With reference to a French translation of this epigram, Franklin is said to have written: "Notwithstanding my experiments on electricity, the lightning continues to fall before our noses and our beards, and as regards the tyrant there were more than a million of us engaged in tearing the sceptre from his hands."[1] The Latin epigram was first applied to Franklin by the French statesman Turgot (1727-81), and was probably suggested by a hexameter line (Manilius, *Astronomicon*, i, 104) relating to the influence of the teaching of Epicurus against superstitious fears. The indirectly life-saving discovery of how to produce anæsthesia (the "death of pain," as S. Weir Mitchell called it) for surgical operations is, I believe, commemorated by minor works of art as well as by some pictures.

Many paintings, drawings and prints relating to anatomical dissections and demonstrations, and dead bodies for anatomical or pathological examination, including Rembrandt's famous "Anatomical Lecture," old and modern portraits of Vesalius and others dissecting, or about to dissect or demonstrate, fall under this heading. A great number of famous dissection pictures (chiefly Dutch "anatomies" of the sixteenth and seventeenth centuries) are beautifully illustrated in the second edition of E. Holländer's "Die Medizin in der Klassischen Malerei" (Stuttgart, 1913, pp. 15-87). They help to illustrate the life-work of anatomists, physiologists, pathologists and anthropologists. An interesting contemporary painting in the Hunterian Library at Glasgow pictures John Banister (1533-1610) delivering the "Visceral Lecture" at the Barber-Surgeons' Hall in London, 1581.[2] There exist likewise various satirical or comical representations (including "initial letter" subjects, &c.) relating to anatomical demonstrations, dissections and post-mortem examinations.[3]

In this group I would likewise place the medals (bearing the device of human skulls) of F. J. Gall (1758-1828), the founder of the "phrenological doctrine," those of J. F. Blumenbach (1752-1840), the anatomist and anthropologist, and of the naturalist, Professor Karl Vogt, of Geneva (1817-95); and certain medals (with skulls or skeletons on them) relating to medical and allied sciences—for instance, the medals of the Company of Surgeons and the present Royal College of Surgeons of England, representing the story of Galen and the skeleton of the robber. The reverse of the original medal of the Company of Surgeons (1767) was made by Thomas Pingo, who, for that purpose, as Mr. T. E. James observed to me, evidently to a large extent copied the design of the frontispiece of William Cheselden's "Osteographia" (London, 1733). In Galen's time it must have been very difficult to get the opportunity of studying from actual skeletons—even at medical schools skeletons were rare, and it may be called to mind that Apuleius (the author of the "Metamorphoseon," or "Golden Ass" romance), who, like Galen, was born about 130 A.D., was accused amongst other things of possessing a skeleton—*for purposes of magic.* There was, therefore, some danger in possessing a skeleton in those days.

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[1] See *Brit. Med. Journ.*, 1914, i, p. 549.

[2] *See* D'Arcy Power, *Proc. Roy. Soc. Med.* (Section of the History of Medicine), 1913, vi, p. 19.

[3] Representations on old illuminated manuscripts of the removal of the heart or intestines from dead bodies previously to burial, may be mistaken for early pictures of post-mortem examinations.

No medals have as yet been designed referring to death from the standpoint of the doctrine of the immortality of germ-plasm (August Weismann, &c.).

Various commemorative medals of medical men and their life-work, and medals relating to sanitation and public health, illustrate to some extent medical, sanitary and social attitudes towards death. Certain coins[1] of Selinus in Sicily (of the period *circa* 466-415 B.C.) may likewise be referred to in the same connexion, since their types commemorate the freeing of Selinus from a pestilence of some kind (malaria?) by the drainage of the neighbouring marshlands. They therefore illustrate a grand and public-spirited "hygienic" attitude towards preventible death from endemic infectious disease in the fifth century B.C. The spreading devastating epidemics of the dark ages of hygienic knowledge are abundantly illustrated in art, epigram and poetry. An engraving by the "Meister H. W.," dated 1842, of Death striding through the country, is apparently emblematic of such a visitation. This and a drawing of similar significance by Dürer, dated 1505, I have elsewhere alluded to,[2] but many other illustrations of the same kind might be adduced. For medals and medal-like tokens bearing on this subject the little work entitled "Pestilentia in Nummis," by L. Pfeiffer and C. Ruland (Tübingen, 1882), should be consulted. Very interesting are the medals, &c., on which fatal epidemics of plague and other infectious diseases are referred to as punishments or retributive calamities, visitations or manifestations of the Divine wrath on account of the wickedness of the people.[3]

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[1] *See* F. P. Weber, "Aspects of Death in Art and Epigram," Lond., 2nd ed., 1914, pp. 222-224.

[2] Loc. cit., pp. 31-33, and fig. 5.

[3] Loc. cit., pp. 302-304.

Acute epidemic diseases, such as plague, "cholera morbus," "typhoid" fever ("typhus abdominalis" of German physicians), "typhus" fever ("typhus exanthematicus" of German physicians), have been often represented emblematically as demons in works of art. Some modern weird and fanciful designs, representing the deadly power of infectious diseases, I have mentioned elsewhere,[1] and many others of various periods exist, especially in regard to cholera epidemics. In this connexion an amusing article is that by Dr. J. H. Alexander, in the *Medical Press* (London, 1913, vol. cxlvii, p. 229), headed "Are Micro-organisms the Demons of the Ancients?" He points out how strongly the facts now proved to be true about pathogenic and other micro-organisms resemble what was believed by the ancients to be true regarding demons, and what is still believed to be true regarding them by the superstitious of modern times in various parts of the world. Amongst their remarkable characteristics in common might be instanced: their universal presence, especially about decaying bodies and dark, damp, sunless places; their power of entry into living bodies; the minuteness of the space taken up by them; and their invisibility to ordinary eyes.

The ravages of more chronic infections and other diseases, such as tuberculosis, syphilis and cancer, have been similarly fancifully represented, and in this connexion it may be recalled that from Babylonian and Assyrian times (cf. Professor Morris Jastrow, jun., Lecture at the Royal Society of Medicine, London, October 10, 1913 [2]), all kinds of diseases, but especially acute disease, were regarded as caused by demons.

Some violent, painful, non-infectious diseases, such as an acute attack of gout, have, like infectious diseases, been symbolized as a demon attacking part of the body—witness James Gillray's famous coloured print of the "demon of gout" attacking the ball of the big toe, one of the most popular of this caricaturist's works, published in 1799 by Mrs. H. Humphrey, at 27, St. James's Street, London. Amongst satirical representations of deaths from non-epidemic diseases, that by Ch. Aubry, 1822, entitled, "L'Apoplexie foudroyante" (a bloated-looking, thick-set man, stretched out on a couch in the dining-room), may specially be noted.[3] This may be compared to Grandville's design[1] of the apoplectic-looking baron after his good dinner, telling his servant to say that he is "not at home" to a visitor (Death), who is, however, entering the room without waiting for permission. (This design seems to have inspired one of Death being asked to "come in," by Willibald Krain, in *Jugend.*) Alfred Rethel has pictured Death, as a cook, in the kitchen of a rich gourmand's house. Hogarth's "Gin Lane," and "La Vice Suprême," by Félicien Rops, should also be mentioned.[2]

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[1] *See* F. P. Weber, "Aspects of Death in Art and Epigram," Lond., 2nd ed., 1914, pp. 84-90.

[2] *Proceedings*, p. 113.

[3] *See* Holländer, "Die Karikatur und Satire in der Medizin," 1905, plate iii.

Certain medals[3] relate to the sanitary disposal of the dead—e.g., to the cremation of corpses and to the prohibition of burials within cities and towns or inside churches and other closed buildings. A not uncommon device which relates to medical work is that of a skeleton-like figure (representing Death or Disease) being withheld or driven back as the result of hygienic work or medical skill and devotion; for instance, the obverse design on the military-like medals awarded to all those who helped in sanitary work, &c., during the epidemic of bubonic plague in Hong-Kong, 1894. Similarly, Æsculapius is represented warding off a figure of Death on a medal commemorating the epidemic of cholera in Paris, 1832. The device on certain medals of the Royal Humane Society, London, is much more pleasing. A child is pictured endeavouring to rekindle a torch with its breath, and the accompanying inscription is "Lateat scintillula forsan." Many of the great advances in medical knowledge and surgery in opposing disease and unnecessary death are commemorated or alluded to on medals (there is, for instance, a medal recording the recent triumph of Paul Ehrlich and S. Hata) and minor works of art; but, to take one instance alone, the account of the medals relating to Edward Jenner and the discovery of vaccination would use up more space than I have the command of. Such discoveries and, especially, the modern scientific and practical work of Pasteur, Lister, Koch, Ehrlich, E. von Behring, Ronald Ross, Patrick Manson, W. C. Gorgas, &c., have helped Medicine to climb the lowest rungs of the endless ladder of progress, and have encouraged the application of cheering lines from Arthur Hugh Clough's well-known poem, "Say not the struggle nought availeth," to the steadfast hope and striving advance of the still very youthful sciences of Hygiene and Therapeutics.

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[1] *See* F. P. Weber, loc. cit., p. 89.

[2] *Ibid.*, pp. 86, 87, 89.

[3] *Ibid.*, pp. 314, 325, 326.

To my mind the life-saving progress of the medical sciences should be symbolized by the *infant* Hercules in his successful struggles, rather than by the frequently repeated device of the *adult* Hercules attacking the Lernean Hydra. In this connexion one naturally thinks of Sir Luke Fildes's beautiful and very popular picture of "The Doctor" (1892). For the description of medals of medical interest, I would refer especially to the writings of Dr. H. R. Storer, in the *American Journal of Numismatics* and elsewhere.

I have referred elsewhere to medals relating to the saving of life at great personal risk and to death for the sake of medical duty or medical investigation.[1] But for the ordinary medical man "Aliis inserviendo vivo" is surely as good a motto as "Aliis inserviendo morior" or "consumor" (the motto of Tulpius, whose features Rembrandt's art has made familiar).[2]

Here, perhaps, may likewise be mentioned the gem-stones (often engraved with special devices), the finger-rings, the coins, the coin-like tokens, the medalets and medals, and the talismans and amulets of all kinds, which, at various times and various parts of the world, have been worn, and even nowadays still are carried about the person or somehow employed as supposed means of prevention—as "charms" to ward off disease, the effects of poisons, accidents, the "evil eye," and death. A description of all the objects which have been used for supposed protection against the "evil eye" would alone take up too much space; and amulets of this class are still employed by ignorant peasants of Italy and the South of Europe—vide S. Seligmann, "Der böse Blick," two volumes, Berlin, 1910. On this whole subject *see* also "The Evil Eye," by F. T. Elworthy, London, 1895, and "Horns of Honour and Other Studies," by the same author, London, 1900. In the last-mentioned work special information is given in regard to antique "symbolic hands" and the curious terra-cotta "magic" or "sacred" disks met with in many museums of Greek and Roman antiquities. The "symbolic hands" are amongst the most interesting "magic" objects which were supposed to serve as a protection against the "evil eye"; they are always covered over with the attributes of deities and other symbols. Amongst the Greek and Roman antiquities in the British Museum, arranged to illustrate the daily life of the ancients, there are fine specimens in bronze of such "symbolic hands." Phallic and other "charms" worn by women desirous of becoming mothers constitute of themselves a large minor class, and their use has not yet been altogether given up. The New Zealand Maori charms, called "Tikis," of bone or finely polished green jade, with inset circles of mother-of-pearl for the eyes, are some of the most curious of amulets from the collector's point of view. Occasionally a special virtue has been popularly attributed to certain coins, and they, like "cramp-rings" (finger-rings sometimes made out of old coffin-nails, &c.), have been worn as charms against cramp, epilepsy and convulsions.[1] We need scarcely here allude to the gold "angels" and their connexion with the royal ceremony of "touching for the king's evil" in England, or to the so-called "touch-pieces" which afterwards replaced them.[2] A Greek bronze coin of Laodicea, in Phrygia (136 to 138 A.D.),[3] which I presented to the British Museum, had in ancient times been pierced and furnished with a bronze ring for suspension, probably to be worn as a "charm" against sickness or death, on account of the figures of Asklepios and Hygeia represented on the reverse.

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[1] Very interesting in this connexion, though of doubtful significance, are the medals on the death of Dr. Wenzel Beyer of Karlsbad (1526). *See* F. P. Weber, loc. cit., pp. 245-248; *see* also *ibid.*, p. 170.

[2] N. P. Tulpius (1593-1678), physician and Burgermeister in Amsterdam, whose portrait is so well known nowadays owing to Rembrandt's famous picture (1632), called "The Anatomical Lecture" (Hague Picture Gallery), had as a motto, "Aliis inserviendo consumor"; it is inscribed on his portrait by N. Elias, in the Six Gallery, Amsterdam. This motto occurs also on coins of Julius, Duke of Brunswick-Wolfenbüttel (1568-89).

Strictly speaking, an *amulet* was supposed to protect the possessor, whilst a *talisman* gave him some magical power (like the lamp and ring of Aladdin in the "Arabian Nights"), but the two terms have become practically synonymous.

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[1] In England, in the seventeenth century, there was a special *office* (ecclesiastical ritual) for the consecration of "cramp-rings."

[2] For medals, coins, and coin-like tokens used as amulets, talismans, or charms against the plague, cholera, and other deadly epidemic diseases, accidents in travelling, &c., see the section, "Auf Pest und pestartige Krankheiten und deren Abwehr geprägte Medaillen, Jetons, &c.," in "Pestilentia in Nummis," by L. Pfeiffer and C. Ruland, Tübingen, 1882, pp. 73-126; also the section on cholera, *ibid.*, pp. 153-69. Amongst the best-known pieces of the kind are the various so-called "Wittenberger Pestthaler" of the sixteenth century, with Moses' brazen serpent on the obverse and the Crucifixion on the reverse; some of these Pestthaler were perhaps really made at Joachimsthal, the flourishing mining town of Bohemia. The series of St. Benedict amulets, or "Benedicts-Pfennige (cf. F. P. Weber, loc. cit., pp. 301-02) are likewise very interesting. The earliest pieces are doubtless of the seventeenth century, but the type has been more or less preserved to modern times on medalets sold to credulous pilgrims at various popular shrines of Southern Germany and Switzerland. *See* also Karl Domanig, "Die Deutsche Medaille," Vienna, 1907, plates 92 and 93, for figures of "Georgsthaler," and pest-medals and amulets of various kinds.

[3] Described by Mionnet, "Description de Médailles Antiques Grecques," Par., 1807-37, iv, No. 743.

In regard to antique and mediæval talismans and amulets of all kinds, against the "evil eye," diseases, &c., *see* also C. W. King's volume, entitled "Early Christian Numismatics and other Antiquarian Tracts," London, 1873, pp. 173-247. On p. 202 King narrates a remarkable story regarding one kind of "medical" amulets: "Ismayl Pasha, son of Mohammed Ali, on his return from his expedition to Meroë, took up his quarters with a small guard in a hut at Chendy, Sennaar, imagining the country quite reduced to subjection. But Nimir, the former king, came by night, placed combustibles round the hut, and consumed it, with all those inside. The guard was cut to pieces by these Nubians, with the exception of the pasha's physician, a Greek, who was carried off for the more evil death. His captors drew out all his teeth, which they divided amongst themselves to sew up in their *grigri* bags, it being their firm belief that whosoever carries about him the tooth of a physician (drawn whilst *living*) secures himself thereby from all diseases for all time to come." The kind of African amulet termed a *grigri*, *greegree*, or *griggory*, is generally a little leather bag enclosing passages of the Koran or other charm-like objects. One grigri is supposed to protect the wearer from shot, another from poison, another from venomous beasts, another from evil spirits and witches, and so on.

On p. 316 of the same work King adds the following interesting note regarding another kind of "medical" amulet: "Mightily esteemed during the Middle Ages as a prophylactic against all disease was the *Sign of Health*—the 'masonic pentacle,' or *Solomon's Seal*, having in each of its exterior angles one of the letters of the word SALVS, thus arranged for the sake of mystery: V.A.L.S.S. It became the badge of the medical profession, and was regularly carried by physicians engraved on their rings. A grand example of the fashion I observed in that treasure-house of similar rarities, the dactyliotheca of Mr. Octavius Morgan, a gold ring of extraordinary weight, bearing the life-giving symbol elegantly engraved in a circle formed by the coiled serpent of the god of health. Marguerite de Valois adopted this for her device, perhaps induced by the analogy of the word to her own family name."

On Mithraic and the various classes of Gnostic amulets and talismans, *see* Franz Cumont, "Textes et Monuments figurés relatifs aux Mystères de Mithra" (Bruxelles, 1899), and his "Die Mysterien des

Mithra" (German edition by G. Gehrich, Leipzig, 1911); and C. W. King, "The Gnostics and their Remains," second edition, London, 1887. Especially interesting is King's account (op. cit., p. 195) of the explanation of the mode of action of the "evil eye" or the "envious eye," as given in the "Aethiopica" (iii, 8) of Heliodorus, in a passage which is likewise interesting with regard to theories current at the time (fourth century A.D.) on the communicability of infectious diseases: "The air which surrounds us passing through the eyes, as it were through a strainer, and also through the mouth, the teeth, and the other passages, into the inward parts, whilst its external properties make their way in together with it—whatever be its quality as it flows in, of the same nature is the effect it disseminates in the recipient, so that when anyone looks upon beauty with envy, he fills the circumambient air with a malignant property, and diffuses upon his neighbour the breath issuing from himself, all impregnated with bitterness, and *this*, being as it is of a most subtile nature, penetrates through into the very bone and marrow. . . . Consider also, my Charicles, how many people have been infected with ophthalmia, how many with other pestilential diseases, not from any contact with those so affected, or from sharing the same bed or same table, but merely from breathing the same air. . . . And if some give the stroke of the Evil Eye even to those they love and are well disposed towards, you must not be surprised, for people of an envious disposition act not as they wish, but as their Nature compels them to do." Even amongst non-superstitious moderns the "evil eye" (in the form of a disagreeable "stare") has sometimes been potent enough to produce death (by a duel!) The old saying, "A cat may look at a king," should not be acted on when persons pathologically sensitive to being looked at ("ophthalmophobia") are concerned.

The medical profession has always been and will always be peculiarly exposed to satire, because it struggles against disease and death, and because death, by the inexorable laws of Nature, must in every case, sooner or later, win the battle. The old proverb, "Physician, heal thyself" (St. Luke iv, 23), is indeed unanswerable, for in the end Death always comes for the physician himself, as he is represented doing in the various famous "Dance of Death" series. In reality, however, St. Luke's Ἰατρὲ θεράπευσον σεαυτόν only meant, "Physician, *treat* yourself," like the Vulgate version, "Medice, cura teipsum." (Similarly, the saying, "Medicus curat, Natura sanat," means, "The physician treats—*cares for;* Nature heals—*cures.*")[1] In regard to the physician being fetched by Death in the various "Dance of Death" series, an anonymous Dutch engraving of the seventeenth century may be mentioned, in which Death is depicted conducting a sick man to have his urine examined by a doctor (as in one of the Holbein woodcuts), but Death has doubtless come for the Doctor himself. In a "Dance of Death" scene, engraved by Zimmermann in a Swiss almanac, Death brings his urine to the doctor for inspection, whilst in the "Totentanz" (where the physician is pictured wearing eye-glasses), printed by Jacob Meydenbach, at Mainz, in 1491, and in the "Danse Macabre," by Cousteau, published by Antoine Vérard in 1492, and in some other series, Death calls for the doctor just as the latter is engaged in inspecting a flask of urine; in a French eighteenth-century series (1788) the doctor lets the flask of urine fall to the ground when Death catches hold of his coat.

As Shakespeare ("Cymbeline," act v, scene 5) says: "By medicine life may be prolonged, yet death will seize the doctor too." Hans Sachs, the "Meistersänger" of Nürnberg, in his poem, "Der Tod ein End aller irdischen Ding," describes the position of medicine towards death at somewhat greater length. He makes the Healing Art say:—

"Ich bin nur ein Hilf der Natur,
Die Krankheit zu arzneien nur.
Wo Glück mitwirkt, da hab ich Kraft;
Sunst hilft kein Fleiss noch Meisterschaft."

We need not here allude to all the proverbs, epigrams, epitaphs, witty tales, and cheap jokes of the "chestnut" kind—ancient and modern—that exist in dispraise of the doctor. They mostly hint at the cure (i.e., "cura" = treatment), or the doctor, being as bad as, or worse than, the disease ("Pessimus morbus est medicus"—so, also, "Young doctors kill their patients, and old doctors allow them to die"),[2] and suggest that the doctor sometimes, from ignorance or carelessness, does more harm than good, and thus unwittingly plays into the hands of Death. We have the modern epitaph on the quack doctor whom Charon did not wish to ferry across the Styx, because in the upper world he was so useful in sending down passengers for Hades ("Nugæ Canoræ," by the London surgeon, William Wadd, 1827, epitaph 55):—

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[1] A favourite phrase in the writings of the famous French sixteenth century surgeon, Ambroise Paré, was: "I treated him, God cured him."

[2] Compare, farther on, the difference made between allopathy and homœopathy.

"This quack to Charon would his penny pay:
The grateful ferryman was heard to say—
'Return, my friend! and live for ages more,
Or I must haul my useless boat ashore.'"[1]

A similar German epigram by G. E. Lessing refers to Laïs and other beautiful courtezans, and to physicians, as being all of them too useful to Death to be allowed to die young.

Martial's satirical epigrams (for excellent English versions of most of Martial's epigrams relating to medicine, *see* Raymond Crawfurd's recent paper) on "Diaulus"(book i, 31 and 48), on an oculist who became a gladiator (book viii, 74), and on Hermocrates (book vi, 53), are typical examples of the kind—

"Chirurgus fuerat, nunc est vespillo Diaulus:
Coepit quo poterat clinicus esse modo."

"Nuper erat medicus, nunc est vespillo Diaulus:
Quod vespillo facit, fecerat et medicus."

"Hoplomachus nunc es, fueras ophthalmicus ante.
Fecisti medicus quod facis hoplomachus."

"Lotus nobiscum est, hilaris cenavit, et idem
Inventus mane est mortuus Andragoras.
Tam subitæ mortis causam, Faustine, requiris?
In somnis medicum viderat Hermocratem."

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[1] This uncomplimentary epitaph was doubtless suggested by the very complimentary lines on a physician, by Lucilius, or by similar lines on various physicians, in the "Greek Anthology." An English translation from Lucilius is given in H. P. Dodd's "Epigrammatists," Lond., 1870, p. 50:—

"When Magnus passed below, Dis, trembling, said,
'He comes, and will to life restore my dead.'"

This Magnus was probably a physician at the Roman Imperial Court. J. D. Rolleston, *Proc. Roy. Soc. Med.* (Section of the History of Medicine), 1914, vii, p. 8, quotes three epigrams from the "Greek Anthology," illustrating this idea of the physician depopulating Hades. The first ("Anth. Graec. Plan.," 270) is an epigram by Magnus (? the above-mentioned physician) on a statue of Galen: "There was a time when, thanks to thee, Galen, the earth received men mortal and reared them up immortal, and the halls of Acheron were empty owing to the power of thy healing hand." The second is an epigram by an anonymous writer ("Anth. Graec. Append.," Tauchnitz edition, 1829, 119) at the end of an hexameter poem on Asklepiades: "The physician Asklepiades has gone to the home of the blessed, and has left desolation and solitude among the dead." The third epigram is by Crinagoras on the statue of Praxagoras ("Anth. Graec. Plan.," 273): "The son of Phœbus implanted in your breast, Praxagoras, the knowledge of the healing art. All the ills which arise from long fevers and the balms to place on the wounded skin, thou has learnt from his gentle wife, Epione. If mortals had a few physicians like thee, the barque of Charon would not have to cross the Styx."

This last one (cf. the similar epigram by Lucilius, "Anth. Graec." Tauchnitz edition, xi, 257) is outdone by the Greek lines which have been attributed to Nicarchus ("Anth. Graec.," Tauchnitz edition, xi, 118) on a (doubtless imaginary) doctor named Phido ("drawing-room equivalent" given in Dodd's "Epigrammatists," 1870, p. 52)—

"Phido nor hand nor touch to me applied ;
Fever'd, I thought but of his name—and died."

Amongst the many epigrams in dispraise of physicians or quacks cited from the "Greek Anthology" by Dr. J. D. Rolleston[1] are several which bear on the present subject. An anonymous epigram ("Anth. Graec.," Tauchnitz edition, 1829, xi, 125) describes a compact between a doctor and a gravedigger, whereby the gravedigger supplies the bandages stolen from the corpses, in return for which the doctor sends all his patients to the grave. An epigram of Nicarchus says (*ibid.*, xi, 115) : "If you have an enemy, Dionysius, don't call down on him the wrath of Isis, nor of Harpocrates, nor of any god that makes men blind, but invoke Simon, and you will learn what a god can do and what Simon." Two epigrams (Rolleston writes) allude to artistic tastes combined with the swift dispatch of patients. One is by Nicarchus (*ibid.*, xi, 113) : "The physician Marcus touched the statue of Zeus yesterday, and though it is stone and Zeus, it has gone to-day (like his patients)." The other is by Ammianus (*ibid.*, xi. 188) : "Nicetas when he sings is an Apollo of song, and when he practises medicine he is a slayer [there is a pun in regard to the Greek word ἀπολλύων meaning *slaying*] of his patients." Palladas (*ibid.*, xi, 280) describes the surgeon Gennadius as one who, after exacting his fee, conducts his patients to Hades. Rolleston states further that the readiness and impunity with which physicians and surgeons have been said to kill their patients (a favourite theme for the satirist throughout all ages) are exemplified in many of the Greek epigrams. The mere touch ("Anth. Graec.," Tauchnitz edition, 1829, xi, 114), sight (*ibid.*, 123), thought (*ibid.*, 118), or dream (*ibid.*, 257) of the doctor was said, in satirical epigrams, to have proved fatal. Lucilius, for instance (*ibid.*, 257), wrote : "Diophantus saw the doctor Hermogenes in a dream, and never woke again, although he wore an amulet" (? an amulet against the "evil eye"). "An anonymous poet stigmatizes Damagoras as outweighing plague in the balance (*ibid.*, 334) ; and

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[1] *Proc. Roy. Soc. Med.*, 1914, vii (Section of the History of Medicine), pp. 3-13.

Nicarchus compares another doctor, Zopyrus, to Hermes (Psychopompos), the guide to the infernal regions (*ibid.*, 124); but perhaps the wittiest epigram on the wholesale destruction of the sick is one which has been variously attributed to Lucian, Lucilius, and Agathias (*ibid.*, 401). A doctor sends his son to a tutor, but when the boy had learnt the first three lines of the 'Iliad' [which tell of the Trojan war sending many souls to Hades], his father said this lesson could be learnt at home, as he himself sent many souls to Hades, and for that had no need of a tutor."

Joseph Zabara, the Jewish author of the "Book of Delights" (finished about the year 1200), indulges in many gibes against the medical profession, though he himself was apparently a doctor. Thus, the following saying occurs in one edition: "A doctor and the Angel of Death both kill, but the former charges a fee." Another little story is typical of its kind: "A philosopher was sick unto death, and his doctor gave him up; yet the patient recovered. The convalescent was walking in the street, when the doctor met him. 'You come,' said he, 'from the other world.' 'Yes,' rejoined the patient, 'I come from there, and I saw there the awful retribution that falls on doctors; for they kill their patients. Yet, do not feel alarmed. You will not suffer. I told them on my oath that you are no doctor.'"[1]

To enumerate all the ancient and modern satirical sayings[2] of this kind and describe their artistic representatives, in the way of coloured prints, &c., would be too great a task. The satirical writings of Molière against the medical profession of the seventeenth century have their analogues in modern times in England as well as in other countries.

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[1] *See* Israel Abrahams, "The Book of Delights and Other Papers." The Jewish Publication Society of America, Philadelphia, 1912, p. 12.

[2] *See* especially the extensive collection entitled, "Le Mal qu'on a dit des Médecins," by Dr. G. J. Witkowski, of Paris; on the second series of this work is the appropriate device of a physician riding, with Death mounted on the same horse behind him. Several typical German epigrams of the kind are given by E. Holländer, "Die Karikatur und Satire in der Medizin," Stuttgart, 1905, pp. 175-177. A clever English one is that by "A. C." (*Spectator*, 1897), for which I am indebted to Sir William Osler :—

"Wise Arruns, asked 'How long will Caius live?'
Replied, 'Three days the fatal sisters give':
And Arruns knew the prophet's art. But lo!
Stronger than gods above or gods below,
Euschemon comes: his healing art he tries,
And in a single day poor Caius dies."

About the end of the eighteenth century in England a medical epigram could apparently hardly become popular unless it referred in one way or another to death. Witness the following

Amongst the bitterest attacks in France may be mentioned Léon Daudet's "Les Morticoles," in which much of the medical teaching in Paris during the last decade of the nineteenth century is held up to ridicule and even to abhorrence.

To some extent, a doctor having the care of an acute and serious case may be likened to a whist-player, who, however well he plays, may yet have such bad cards that it is impossible for him to win the game. Yet in other cases his cards may be so good that mistakes in playing do not cause him to lose the game. In yet other cases, however, the playing of one wrong card will give the game into Death's hands. The design of a very striking modern German drawing is, I believe, Death playing a game of chess with a doctor for a human life (unless I am really thinking of Moritz Retzsch's drawing of 1831—the devil playing a game of chess with a young man for his soul, an angel looking on). A modern satirical cartoon by "Cynicus" (Martin Anderson) represents "Death and the Doctor" playing cards over a coffin. The rather corpulent doctor, seated in a comfortable armchair, plays deliberately without the least appearance of excitement, whilst Death seems eager to finish the game. On the coffin are bags of gold, suggesting the financial importance of the result to the doctor. (Cartoon No. 22 of "Cartoons, Social and Political," by Cynicus, published at 59, Drury Lane, London, 1893.)

There exist, of course, a very large number of satirical designs

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very popular ones on the physicians of King George III, namely, William Heberden the younger, Matthew Baillie, and Francis Willis, men at the head of their profession in England, and on the Quaker physician and philanthropist, John Coakley Lettsom, the founder of the Medical Society of London:—

"The King receives three doctors daily—
Willis, Heberden, and Baillie:
Three distinguished clever men—
Baillie, Willis, Heberden;
Doubtful which more sure to kill is—
Baillie, Heberden, or Willis."

"When patients sick to me apply,
I physics, bleeds, and sweats 'em;
Then—if they choose to die,
What's that to me?—I lets 'em."

These humorous lines, with Lettsom's signature at the end, have been (doubtless incorrectly) attributed by some to the physician himself. Several slightly different versions exist.

The version which I have given above is the one authorized by J. C. Jeaffreson, in his very popular "Book about Doctors," but Mr. G. Bethell has kindly drawn my attention to three other versions quoted on equally good authority in *The Gentleman's Magazine* for August, (sketches, engravings, coloured prints, &c.) in dispraise of physicians, surgeons, apothecaries, and naturally quacks and charlatans also. Several of those which are figured in Dr. Eugen Holländer's work, "Die Karikatur und Satire in der Medizin" (Stuttgart, 1905), suggest that the drugs and medical treatment, and not the diseases, kill the patients. There is, for instance, a sketch (Holländer, op. cit., p. 223)

1904 (pp. 133, 134). In all of them the ending imitates Lettsom's signature to his prescriptions, namely, "I. Lettsom." The first is taken from "Old and New London," vi, p. 279—

"When any patients call in haste,
I physics, bleeds, and sweats 'em.
If after that they choose to die,
Why, what cares I?
I lets 'em."

The second claims to be the version told by Lettsom himself to the father of Mr. H. S. Cuming—

"If any folk applies to I,
I blisters, bleeds, and sweats 'em.
If after that they please to die,
Well, then I lets 'em."

The third version was obtained from Mr. Gorton, of the "Golden Sun"—

"I, John Lettsom,
Blisters, bleeds, and sweats 'em.
If after that they please to die,
I, John, lets 'em."

In *Notes and Queries* for March 10, 1906, p. 191, sent to me also by Mr. Bethell, an epigrammatic reply by a friend of Lettsom's is referred to—

"Such swarms of patients do to me apply,
Did I not practise, some would surely die.
'Tis true I purge some, bleed some, sweat some,
Admit I expedite a few, still many call.
I. Lettsom."

Mr. Bethell likewise refers me to *Notes and Queries* for March 17, 1906, p. 210, where a quotation is given from *The Wonderful Magazine and Marvellous Chronicle* for the year 1793, i, p. 346, ending as follows:—

"You say I'm dead, I say you lie,
I physicks, bleeds, and sweats 'em;
If after this my patients die,
Why, *verily*——
J. Lets—'em."

Of only one of these four physicians, namely, Francis Willis, does a portrait-medal exist. The medal in question, of which I had a good specimen in my collection, was struck on the recovery of King George III in 1789, and on the obverse bears a bust of Willis in low relief, with the medallist's signature, C. I. (and a little serpent) on the truncation (the medallist's name is, I believe, unknown). Good portraits exist, however, of the others. Of William Heberden the younger there is a painting by Richard Bothwell, and of Matthew Baillie there is one by John Hoppner, whilst Lettsom occupies a conspicuous place in Samuel Medley's picture of the early members of the Medical Society of London.

of the famous "Doctor Requiem, who cured all those that died" there is the caricature of a charlatan (*ibid.*, p. 162), exhibiting triumphantly the hide of his "last radically cured patient"; there is Daumier's (modern) design of a doctor wondering why all his patients leave him, whilst "imagination" shows a queer procession of imps carrying coffins and the dead bodies of his patients, headed by Death (see *ibid.*, p. 173). Then there is W. Hogarth's "The Company of Undertakers" (1736), with the crowded caricature-portraits of doctors and quacks of the time, and, to complete the satire, the motto, "Et plurima mortis imago" (Virgil, "Aen.," lib. ii, 369), between two pairs of crossed bones (see *ibid.*, p. 179). An older print (*ibid.*, p. 178) shows a doctor inspecting the urine of a dead patient, illustrating the saying, "Après la mort, le médecin." A lithograph by Adolf von Menzel, of about 1832 (*ibid.*, p. 290)—"The Difference between Allopathy and Homœopathy"—shows the allopath and the homœopath both holding banners with the device of a skull and crossed bones; between them are Mephistopheles and Death, the latter grasping both the banners and saying, "Seid einig! einig!" Another caricature (*ibid.*, p. 337), by Th. Heine, shows two very modern looking ghosts floating over a cemetery. One of them apparently is saying, "That's all the difference: With homœopathy one dies of the disease, with allopathy one dies of the treatment."[1] A little German painting (in the Wellcome Historical Medical Museum, 1913) shows a doctor studying in a room overlooking a crowded graveyard. Death (a skeleton) is visiting the doctor as a friend and colleague, and (according to the paper which he holds) is saying, "Mein lieber Herr Collaborator, Sie sind gar zu fleissig" (referring doubtless to the overfull graveyard towards which his left hand is turned). By D. N. Chodowiecki (1726-1801), who likewise made a series of "Dance of Death" designs, there is a small engraving of Death appearing to a medical student, with the following inscription underneath:—

> "De grâce épargne moi, je me fais médecin,
> Tu recevras de moi la moitié des malades."

One of Thomas Rowlandson's "English Dance of Death" series (first volume, London, 1815) shows Death and the quack doctor "Nostrum," outside the shop of the undertaker, "Ned Screwtight";

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[1] Compare the saying already quoted, "Young doctors kill their patients, and old doctors allow them to die."

and the letterpress (by W. Combe) describes how grieved the undertaker was when his friend Nostrum died so suddenly at his door. His wife explained that it was another job for him, and nothing to be sorry about, but—

> " 'You foolish woman,' he replied,
> 'Old Nostrum, there, stretched on the ground,
> Was the best friend I ever found. . . .
> How shall we undertakers thrive
> With Doctors who keep folks alive? . . .
> We've cause to grieve—say what you will;
> For, when Quacks die, they cease to kill.' "

Similar allusions to the undertaker are of course very frequent. Thus, in "The Apothecary's Prayer," by G. M. Woodward (engraved by Thomas Rowlandson in 1801, and published by R. Ackermann, at 101, Strand, London), the Apothecary prays to Aesculapius that people may be ill and require medicines, and mentions that his neighbour, Crape, the undertaker, is suffering considerably by his (the Apothecary's) want of practice. I have seen two little English engravings, signed "W. E. G.," not dated, but apparently of the early part of the nineteenth century, which might be mentioned in this connexion. One of them depicts an apothecary on a horse which is running away and knocking people over. The inscription below is, "What could be expected of a horse with an apothecary on his back?" Below this are the words "Newcastle Apothecary." The other shows a huge widely open mouth, into which a funeral procession of medicine bottles is entering; at the rear of this procession come little figures of Death and the Doctor, apparently good friends, and chatting with each other. The title "A Medical Allegory," is inscribed below this print, on a mortar made out of a human skull with a long bone in it as pestle.

Amongst the caricatures of Medical Consultations (e.g., by L. Boilly, 1760) a remarkable one figured, after C. Motte, by Lucien Nass ("Curiosités Médico-Artistiques," Paris, first series, p. 6), represents four consultants seated in the patient's room. One of them, with much gesticulation, is explaining his views of the case in an excited manner; his discourse has had a soporific effect, not on his patient, but on his colleagues, and even Death (represented as a skeleton holding a scythe), comfortably seated on the ground behind the chair of one of the physicians, appears to have fallen into a doze.

An eighteenth century print of John Lightbody constituting the frontispiece to "A Physical Vade Mecum" (London, 1741), by Theophilus Philanthropos (Robert Poole, 1708-52), illustrates the curious admixture of theology in some medical writings of the time. The physician (apparently a portrait of Dr. Robert Poole, the author) and patient are seated facing each other; the doctor feels the patient's pulse and prescribes for him. In the foreground are a skeleton and a coffin, the latter bearing the inscription: "As now I am, so must you be. Therefore prepare to follow me." On the right in the distance, Death (as a skeleton) threatens the patient with his dart, telling him: "Prepare to die, for behold Death, and Judgment is at hand." The various figures are connected by bands of inscriptions with a triangle (on which is the word ΘΕΟΣ) amidst clouds and cherub-heads in the sky. One of these bands explains what God is saying to Death: "Hold, stay thy hand, and give space of repentance." Below this whole complicated design are the verses—

"In the midst of Life Death doth us pursue,
Let us therefore with Speed for Mercy sue."

In further illustration of the stories current in dispraise of physicians, I will refer to certain little bronze coins struck in the island of Cos, bearing the portrait of Xenophon, a Coan physician, and a descendant of the family of the Asclepiadae, who practised at the Imperial Court of Rome in the time of the Emperor Claudius. Of three of these pieces in my father's collection the inscription accompanying the portrait on two (possibly of the second century A.D.) is ΞΕΝΟΦΩΝ; on the third (apparently of the first century A.D.) it is ΞЄΝΟΦΩΝ ΙЄΡЄΥϹ, showing that Xenophon was apparently a priest of Aesculapius, as well as a physician. This Xenophon, according to Tacitus ("Annal.," xii, 61), obtained certain privileges for his native island from his patron, the Emperor Claudius. According to Tacitus also ("Annal," xii, 67), he had the ingratitude to allow himself to be induced by the Empress Agrippina to help her to murder his patron (54 A.D.) by means of a poisoned feather which he was stated to have introduced into his mouth under the pretence of making him vomit. (For other references on the subject, see the notes in Orelli's second edition of the works of Tacitus, Zürich, 1859, vol. i, p. 388; also Pauly and Wissowa, "Real Encyclopädie der classischen Altertumswissenschaft," Stuttgart, 1899, vol. iii, column 2815.) The account of Tacitus runs as follows (Bohn's Oxford translation, London, 1854, i, p. 311): "In fact, all the particulars of this transaction were soon afterwards so thoroughly known, that the writers of those times are able to recount 'how the poison was poured into a dish of mushrooms, of which he was particularly fond; but whether it was that his senses were stupefied, or from the wine he had drunk, the effect of the poison was not immediately perceived'; at the same time, a relaxation of the bowels seemed to have been of service to him: Agrippina, therefore, became dismayed; but as her life was at stake, she thought little of the odium of her present proceedings, and called in the aid of Xenophon the physician, whom she had already implicated in her guilty purposes. It is believed that he, as if he purposed to assist Claudius in his efforts to vomit, put down his throat a feather besmeared with deadly poison; not unaware that in desperate villainies the attempt without the deed is perilous, while to ensure the reward they must be done effectually at once." From this account of Tacitus it is clear that Xenophon was called to his Imperial patient when the latter appeared to have eaten some poisonous food. He, as a physician, immediately did what would have been expected of him—namely, he endeavoured to induce vomiting (by tickling the patient's fauces with a feather). It is unlikely that any real evidence was forthcoming that he assisted the murder by introducing poison on the feather, or that he was in any way an accomplice in the crime.

Strictly speaking, under this paper's title, one might refer to various memorials and sepulchral monuments bearing inscriptions of medical interest. The famous epitaph on Dame Mary Page, in Bunhill Fields Burial Ground (London) records that she died in 1728, at the age of 55, and that she was tapped (*paracentesis abdominis*) sixty-six times in sixty-seven months, and "had taken away 240 gallons of water, without ever repining at her case, or ever fearing the operation." A similar epitaph on Mrs. Susanna Wood, in the graveyard of Bermondsey parish church, records that that lady died in 1810, aged 58, after a long illness, which she bore with the greatest fortitude: "she was tapped ninety-seven times, and had 461 gallons of water taken from her, without ever lamenting her case or fearing the operation." There is a sepulchral marble at Senlis, commemorating the death, in 1673, after the Cæsarean operation, of a woman who saved the life of her unborn child by voluntarily undergoing that operation; she herself died as the result, and thus by her death for the sake of her child, as the inscription states, "she succeeded in uniting Love and Death." Much grim humour of a homely sort has been displayed in epitaphs relating to the causes of death, but the genuineness of many of them may be doubted. There is, for instance, that on the poor old body, who "had two sore legs and a baddish cough, But her legs it was that carried her off." Then there is one on the old woman who appeared "so cunning, While one leg kept still, the other kept running." The following are "chestnut" examples:—

"This little hero lying here
Was conquered by the diarrhœa."

"Here lie I and my four daughters,
Killed by drinking Cheltenham waters.
Had we but stuck to Epsom salts,
We wouldn't have been in these here vaults."

The next epitaph (on a baby) might well be applied to examples of excessive infantile mortality, of specific origin:—

"Since I am so quickly done for,
I wonder what I was begun for."

Death from gangrene of the foot commencing after the careless cutting of corns (which has not rarely occurred in senile diabetics and arteriosclerotics) is commemorated by a fanciful epitaph, beginning:—

"Here lie the bones of Richard Lawton,
Whose death was strangely brought on,
Trying one day his corns to mow off,
The razor slipped . . ."

J. D. Rolleston[1] refers to several strange causes of death mentioned in epigrams from the "Greek Anthology." A grimly humorous example of such epigrams is the following ("Anthol. Graec.," Tauchnitz edition, 1829, ix, No. 67): "A young man hung a garland on the column of his stepmother's tomb, thinking that in death her character had changed. But the column fell on the tomb and killed the young man. Children of a former marriage, beware your stepmother's grave!" The epigram by Diogenes Laertius (*ibid.*, vii, No. 112) on the peripatetic philosopher Lycon (third century B.C) is thus given by Rolleston: "No, by Zeus, we will not forget Lycon, whom gout killed; but what I marvel at most is that he who could only walk with the feet of others, traversed in a single night the long road to Hades."

One or two epitaphs refer to the "resurrectionist" period in the history of medical and surgical anatomy[2]:—

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[1] *Proc. Roy. Soc. Med.*, 1914, vii (Section of the History of Medicine), pp. 34 *et seq.*

[2] See *Brit. Med. Journ.*, 1908, i, p. 1340, and *Lancet*, 1903, i, p. 899.

"Though once beneath the ground this corse was laid,
For use of surgeons it was thence conveyed.
Vain was the scheme to hide the impious theft—
The body taken, shroud and coffin left.
Ye wretches, who pursue this barbarous trade,
Your carcases in turn may be conveyed
Like this to some unfeeling surgeon's room;
Nor can they justly meet a better doom."

"Her body dissected by fiendish men,
Her bones anatomized,
Her soul we trust has risen to God,
A place where few physicians rise."

With these epitaphs referring to the old "body-snatching" days of the "resurrectionists" Hogarth's "Reward of Cruelty" (1751) may be compared, as it well illustrates the popular horror of the idea of post-mortem examinations in England during the eighteenth century. It is the caricature of the dissection of a criminal's body at Surgeons' Hall in Old Bailey, London. The rope by which the murderer ("Tom Nero") was hung at Tyburn is still around his neck, his intestines are being placed in a pail below the dissecting table, and a dog has taken possession of his heart. The skeletons of two recently executed criminals, labelled respectively "Macleane" (James Maclaine or Maclean, a noted "gentleman highwayman," hung at Tyburn in 1750), and "James Field" (executed for highway robbery early in 1751) adorn niches in the walls. Clearly, in this caricature the anatomists and surgeons who dissect the criminal's body were held out to youthful hooligans as bogies to children—namely, as additional instruments of (post-mortem!) punishment for the crimes committed by murderers, highwaymen, &c. This popular dread of being subjected to dissection after death recalls the mediæval horror of the body being "tortured" after death by being "eaten by worms"—a subject frequently referred to in mediæval and later poetry and art. An engraving of about 1480 by the "Meister I. A. M. von Zwolle" (the "Meister mit der Weberschütze") pictures Moses with the tables of the Ten Commandments in an upper compartment, and a skeleton-like corpse being "eaten by worms" in a lower compartment. The design was evidently intended to illustrate certain passages in "Ecclesiasticus" (x, 11, and xxviii, 6): "For when a man is dead, he shall inherit creeping things, beasts, and worms"; "Remember corruption and death, and abide in the commandments." To increase the horror of the subject mediæval and later art often magnified the worms into serpents. In a short Latin poem by Anselm, Archbishop of Canterbury (died 1109), included in Migne's "Patrologiæ Cursus Completus," the poet speaks of a man dying "a second death" when his body is thus tortured ("cruciatur") after his "death proper":—

"Nam caro mortalis, et quisquis ei famulatur
Morte perit duplici, quia post obitum cruciatur."

After all, this idea of a "double death" is scarcely more far-fetched than Petrarch's poetical idea of a great man's "second death"—that is, when his tomb and monument decay and fall to pieces—and his "third death"—that is, when his writings are destroyed or forgotten. In his third dialogue "De Contemptu Mundi," Petrarch makes Saint Augustine quote the passages in question from his own (Petrarch's) Latin epic poem, "Africa":—

"Mox ruet et bustum, titulusque in marmore sectus
Occidet, hinc mortem patieris, nate, secùndam.
. . . . libris autem morientibus, ipse
Occumbes etiam: sic mors tibi tertia restat."

In works of art representing death-bed scenes the medical attendants have frequently been represented, and by caricaturists (Hogarth, &c.) not always in a light very creditable to the profession. But in one of the illustrations to the mediæval religious "text-book," entitled the "Ars Moriendi," or "Speculum Artis bene Moriendi," the doctor is depicted under very peculiar circumstances. The patient on his death-bed is being tempted by impatience, which for a time he cannot resist. In the British Museum block-book (printed in the Netherlands about 1460) he is shown as having already upset the table with the food and medicine on it, and is unceremoniously pushing the doctor away with his foot, whilst a lady (his wife?) appears (according to the words on the label) to be excusing him on account of his suffering. A demon with bat's wings, by the bed, rejoices at having been successful.[1]

A curious connexion between medicine and death is that illustrations of skeletons in medical anatomical works have sometimes been utilized by artists in designing figures of Death for medals and other works of art. Particularly employed in that way was a certain woodcut in Vesalius's famous anatomical work, "De Humani Corporis Fabrica," printed by J. Oporinus, at Basel, 1543 (p. 164). It represents a skeleton meditating over a skull and leaning on an altar, inscribed: "Vivitur ingenio, caetera mortis erunt" (*see* figure). This design is by Jan von Calcar, a pupil of Titian, whose paintings were said to be almost indistinguishable from those of Titian himself. Jan von Calcar's design

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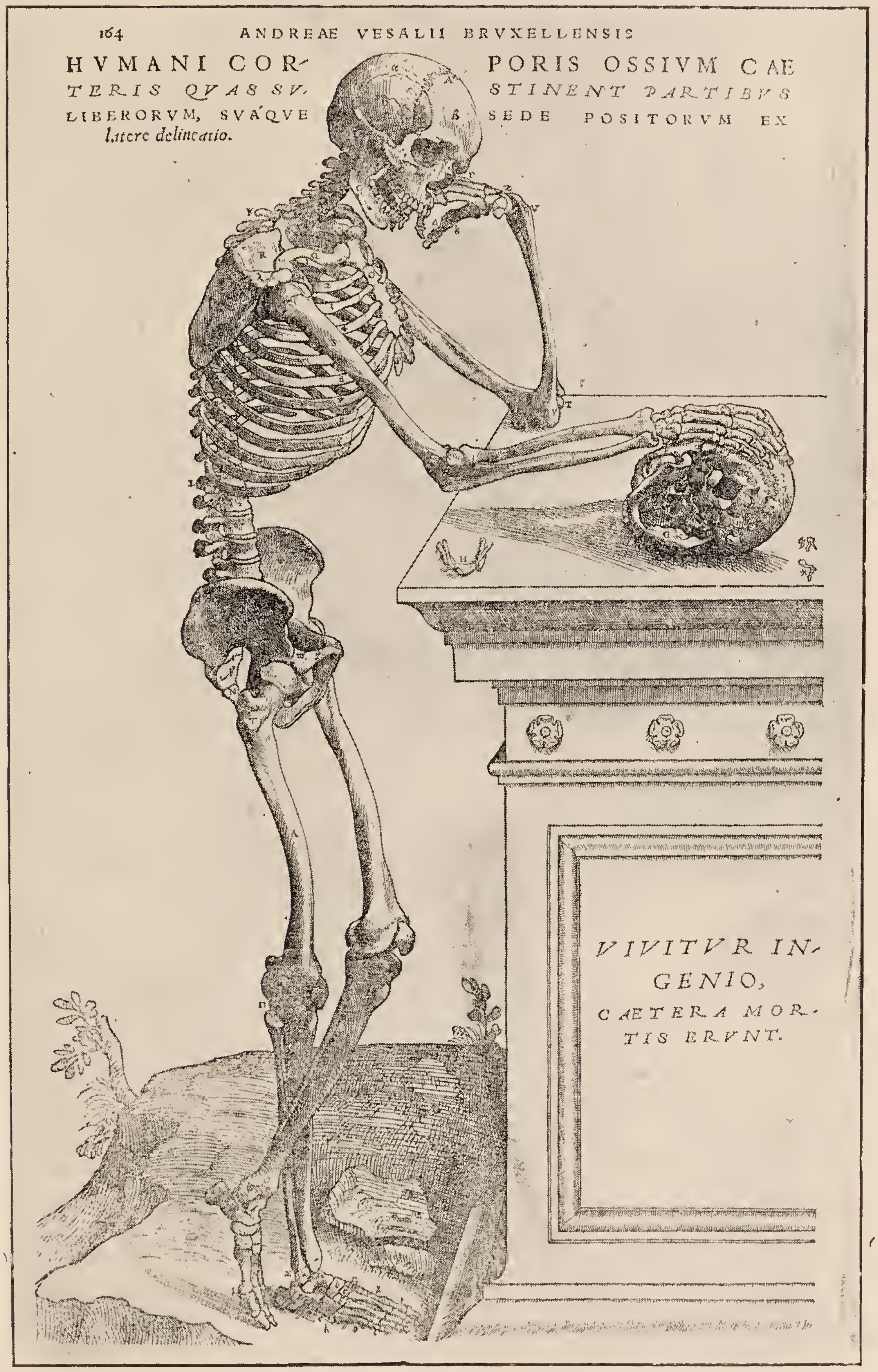
[1] Cf. F. P. Weber, loc. cit., pp. 48-55, also fig. 13 (after Lionel Cust), showing the "temptation by impatience," by the Master E. S.; the design is quite similar to the corresponding illustration in the British Museum block-book version of the "Ars Moriendi."



Anatomical woodcut by Jan von Calcar, on p. 164 of the "Anatomy" of Vesalius, 1543.

evidently suggested the figure of Death (meditating over the apple of the garden of Paradise) in a stone relief of the Renaissance period, figured by J. von Schlosser (" Werke der Kleinplastik," Vienna, 1910, i, plate 2). It likewise suggested the skeleton leaning on an altar on the reverse of certain medals of the Adolph Occos, especially the third physician of that name at Augsburg (died 1606)[1]; also the skeleton on the reverse of a Danish *memento mori* medal, dated 1634, supposed to commemorate the tragic death of Anna Cathrina, a daughter of King Christian IV of Denmark by his morganatic wife, Christina Munk; and indirectly, also, the reverse of a medal by Christian Maler, which was copied from the preceding medal.[2]

The woodcut by Calcar just referred to, with its philosophical inscription, reminds one that formerly philosophical considerations on life and death were sometimes introduced into anatomical lectures and demonstrations. An engraving by Andreas Stock after a painting by J. de Gheyn, shows Pieter Paaw or Pauw (Pavius), demonstrating in the Leiden anatomical theatre; a skeleton is mounted upright in a conspicuous part of the room, holding a banner with the inscription, "Mors ultima linea rerum" (Horace). In another engraving of the theatre, by W. Swanenburg after J. C. Woudanus, in 1610, skeletons are represented holding up *memento mori* and kindred quotations such as the aforesaid "Mors ultima linea rerum"; "Nascentes morimur" (Manilius); "Principium moriendi natale est"; "Mors sceptra ligonibus aequat"; "Nosce te ipsum"; "Pulvis et umbra sumus" (Horace). These sayings were introduced less probably for the benefit and instruction of the medical students than for the edification of the learned men, lawyers, travelling noblemen, fashionable ladies and sight-seers, who in former times used to visit the anatomical theatres out of curiosity or in search of emotional distractions. Note the miscellaneous crowd watching Vesalius dissecting, on the engraved title-page (designed by Jan von Calcar) of his great anatomical work, just referred to, "De Humani Corporis Fabrica" (Basel, 1543).

I might finally allude to the consolation for the idea of death said to be afforded by the evils of old age and disease. Gout is mentioned in this way in some verses addressed to Death in the "Greek Anthology" ("Anthol. Graec., Appendix," Tauchnitz edition, Leipzig, 1829, No. 196):—

Ἦλθες ἐμῆς ζωῆς γλυκερώτερος ὅς μ' ἀπέλυσας
Νούσων, καὶ καμάτων, καὶ μογερὰς ποδάγρας.

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[1] *See* F. P. Weber, loc. cit., pp. 267, 268, and fig. 122 on p. 443. Adolph Occo III (1524-1606) was a numismatist as well as a physician, and was doubtless a friend of the princely and art-loving Fuggers, of Augsburg, of his time.

[2] Cf. F. P. Weber, loc. cit., pp. 273-276; also figs. 56 and 57.

Compare the lines by Agathios ("Anthol. Graec. Palat.," x, 69) and the following Latin epitaph inscriptions:—

"Quod superest homini, requiescunt dulciter ossa,
Nec sum sollicitus ne subito escuriam,
Et podagram (*sic*) careo, nec sum pensionibus arra,
Et gravis aeterno perfruor hospitio."
("Corp. Inscr. Lat.," vi, No. 7193*a*.)

"Morborum vitia et vitae mala maxima fugi.
Nunc careo poenis; pace fruor placidâ."
("Corp. Inscr. Lat.," v, No. 5278.)

If we pass on to Christian writings we find that Anselm, Archbishop of Canterbury (died 1109), in the longer poem, "De Contemptu Mundi," printed in Migne's "Pathologiae Cursus Completus," almost overdraws the ills that human flesh is heir to. But we must remember that very much less was known in Anselm's days than now in regard to the medical and surgical relief of aches and pains of all kinds. Nowadays pain can frequently be removed by ordinary rational methods which formerly lasted very long, or was only escaped from by death. Surgical anæsthesia—the "death of pain"—together with surgical asepsis and antisepsis—the "death of microbes"—often enables modern healing art to ward off death and "kill" the cause of pain. Following is the portion of Anselm's poem to which I wish to draw attention:—

"Si nunc aspicias animalia caetera quaeque;
Invenies tantis subdita nulla malis.
Nos capitis laterumque dolor, febrisque fatigat:
Totum hominem tollit lepra, chiragra manus,
Dira podagra pedes; oculos ophthalmia caecat:
Obsidet arctati pectoris asthma vias.
Laesa suos claudit lithiâ vesica meatus:
Viscera torquentur, parsque pudenda, colon.
Dens dolet, aut cervix; os torpet; lingua ligatur.
Splen tumet; aegrotat pulmo, laborat hepar.
Cor marcet; renes patiuntur; solvitur alvus;
Brachia nil possunt; languida crura jacent."

In like manner, Pope Innocent III (died 1216), in his prose writing, "De Contemptu Mundi" (Migne's edition), pictures (with some humour) the supposed evils of old age. In fact, he gives us a kind of caricature of its infirmities: "Si quis autem ad senectutem processerit, statim cor ejus affligitur, et caput concutitur, languet spiritus et fetet anhelitus, facies rugatur, et statura curvatur, caligant oculi, et vacillant articuli, nares effluent, et crines defluunt, tremit tactus, et deperit actus, dentes putrescunt, et aures surdescunt. Senex facile

provocatur, difficile revocatur; cito credit, et tarde discredit, tenax et cupidus, tristis et querulus, velox ad loquendum, tardus ad audiendum, sed non tardus ad iram: laudat antiquos, spernit modernos: vituperat praesens, commendat praeteritum, suspirat et anxiatur, torpet et infirmatur. Audi Horatium poetam: 'Multa senem circumveniunt incommoda.' Porro nec senes contra juvenem glorientur, nec insolescant juvenes contra senem, quia quod sumus iste fuit, erimus quandoque quod hic est."

Note (p. 22).—In regard to Petrarch's curiously far-fetched idea of a great man's second and third deaths, the following simple passages may be quoted by way of contrast:—

"And though long sunk from sight, I know
The Glory of your afterglow
Will never wholly fade."

"So, when a great man dies,
For years beyond our ken,
The light he leaves behind him lies
Upon the paths of men."

EXCESSIVE FEAR OF DEATH AS A MORBID PHENOMENON.

La Rochefoucauld said that man could no more look steadily at death than at the sun. But certainly man may, without harm to himself, see death or ideas on death reflected in works of art. Just so, in the ancient legend, Perseus was able, without being turned into stone, to behold the head of the Gorgon Medusa, reflected in the mirror given to him by Athene; and thus he succeeded in slaying the dreadful monster.

A study like the present one to some extent increases one's knowledge and brings with it a certain amount of satisfaction, though neither this nor any other study can quite place one in the position described by Virgil:—

> "Felix qui potuit rerum cognoscere causas;
> Atque metus omnes, et inexorabile fatum
> Subjecit pedibus, strepitumque Acherontis avari!"

The fancied terrors of death have been naturally more frequently illustrated by engravings, drawings, and paintings than by medals, engraved gems, &c. The idea of representing the decaying body as being occupied by long worms, snakes, toads, &c. (i.e., as being "eaten by worms," according to a phrase still in use in some countries), was doubtless chiefly derived from Ecclesiasticus (x, 11), "For when a man is dead he shall inherit creeping things, beasts, and worms." An engraving (alluded to on p. 21) of about 1480, by the "Meister I. A. M. von Zwolle" (the "Meister mit der Weberschütze"), represents Moses with the tables of the ten commandments in an upper compartment, and a skeleton-like corpse being "eaten by worms" in a lower compartment. This design is evidently meant to illustrate another particular passage in Ecclesiasticus (xxviii, 6), "Remember corruption and death and abide in the commandments." Snakes were preferred to worms in order that the artist might magnify the horror of his subject.[1] Even when Death was represented by a skeleton or a shrivelled figure of skin and bones (the German *Hautskelett*) in lifelike attitude, the snakes and toads were often not omitted. Thus, in a German fifteenth century woodcut (by an unknown artist) of "Death in the Jaws of Hell" (reproduced in the "Catalogue of Early German and Flemish Woodcuts in the British Museum," by Campbell Dodgson, 1903, vol. i, pl. 2), Death, who is represented by a shrivelled figure of skin and bones (in the mouth of a monster who is vomiting up flames), is accompanied by a snake and has a toad in place of the conventional fig-leaf.[2] So also, in the fifteenth-century engraving of "Death warning a Youth," by the "Meister des Amsterdamer Kabinets,"[3] the lifelike shrivelled figure representing Death is accompanied by a toad and snake.

I have elsewhere[4] referred at some length to the horror-inspiring aspect of *memento mori* religious art and to the ghastly spectacle of decay and putrefaction revealed in pictures by Valdes-Leal, &c. A small panel-painting in the possession of Dr. Pietro Capparoni, of Rome,[5] seems to rival all others in this respect. It represents a man's head in a state of putrefaction and being "eaten by worms" and coleoptera. The head rests on a closed book; by the side is a winged hourglass, and above is suspended a small iron lamp, such as might be used to illuminate a dismal vault. In the upper right corner is the inscription from Ecclesiasticus xli, 1, "(Mors) amara habenti pacem in substantiis suis." The picture does not seem to me a very early one. In this connexion one may well remember the lines of Edward Young ("Night Thoughts," 1742):—

> "The knell, the shroud, the mattock, and the grave;
> The deep damp vault, the darkness, and the worm;
> These are the bugbears of a winter's eve,
> The terrors of the living, not the dead."

---

[1] In regard to the spontaneous generation of worms and snakes from decaying corpses, an interesting passage is that quoted by Jules Guiart from Pliny the Younger ("Hist. Nat.," lib. x, cap. 66): "Anguem ex medullâ hominis spinale gigni, accepimus a multis. Pleraque occultâ et caecâ origine proveniunt, etiam in quadrupedum genere." Guiart thinks that the mediæval representation of decaying corpses being "eaten by worms" was preferred by the artists of the time as being more horror-inspiring (and therefore having a more powerfully *memento mori* admonitory effect) than the representation of dry skeletons. This is extremely probable, and moreover, the artist's deficient anatomical (osteological) knowledge was somewhat hidden by the ragged skin which covered the skeleton and partially concealed such mistakes as those of the Meister von Zwolle, who, in the above-mentioned design, placed the shoulder-blades of the skeleton-like figure in front of the thorax instead of on the back.

[2] *See* F. P. Weber, loc. cit., p. 209, fig. 32.

[3] *See* F. P. Weber, loc. cit., p. 34.

[4] *See* F. P. Weber, loc. cit., pp. 56-68.

[5] *See* F. P. Weber, loc. cit., p. 211, fig. 33.

The attributes and pomp of death may frighten more than death itself. Cf. Bacon's "Essays": "Of Death," and his reference to a supposed passage on the terror of the pomp of death in the writings of an ancient philosopher: "Pompa mortis magis terret quam mors ipsa." Yet the "pomp of death," in the form of a funeral or funeral procession, has been appreciated by great rulers (the Emperor Charles V, &c.); it is a spectacle still dearly loved by a certain class of the community, and in the hearts of many servant-girls and others is only rivalled by the pomp of weddings. The immense importance attached to burial and funeral rites by the ancient Greeks and Romans can hardly be realized nowadays. Thus, it was considered a man's supremely "pious" duty to see to the burial of relatives, friends, and companions in arms. The idea of Pompey's corpse lying (for a time) unburied on the Egyptian shore formed the subject of a fine Latin epigram by the Italian poet, Francesco Molza (died 1544). Of this John Fiske quoted the following (somewhat defective) paraphrase:—

> "We grieve not, Pompey, that to thee
> No earthly tomb was given;
> All lands subdued, nought else was free
> To shelter thee but Heaven!"

The relative fear or fearlessness of death has formed the subject of many epigrams and passages from famous authors. Casca, in Shakespeare's "Julius Cæsar," says: "Why, he that cuts off twenty years of life, cuts off so many years of fearing death." Again, in the same play (act ii, scene 2), Cæsar says:—

> "Cowards die many times before their deaths;
> The valiant never taste of death but once.
> Of all the wonders that I yet have heard,
> It seems to me most strange that men should fear,
> Seeing that death, a necessary end,
> Will come, when it will come."

Lucilius, the Latin satirical poet of the second century B.C., wrote (translated by W. Cowper):—

> "Far happier are the dead, methinks, than they
> Who look for death, and fear it every day."

Seneca (Epist., 69) spoke of the folly of dying from the fear of death ("Stultitia est timore mortis mori"), and Robert Burton, in his "Anatomy of Melancholy" (1621), quoted as a "true saying," "Timor mortis morte pejor." This particular point is well illustrated by one of Thomas Rowlandson's coloured caricatures (1792), entitled "The Hypochondriac." The miserable patient, seated in a chair, is a prey to fears. He sees a hearse and a skeleton (Death) threatening to spear him, whilst a ghastly figure personifying Suicide offers him a pistol or a rope to kill himself with. Francis Bacon (in the essay already referred to) allows that the pomp and circumstance attending deaths make the idea of death terrible; "groanes and convulsions and a discoloured face, and friends weeping and blackes (i.e., hired mourners ?) and obsequies, and the like"; but he also reminds one that the fear of death is not strong enough to prevent it being mastered by various human passions, including revenge, love, and honour.

In regard to the fear of death, much depends on a man's philosophical and religious ideas on life and death, but very much depends also on his age, his aims and aspirations, his surroundings, his means and opportunities for (and power of) enjoyment, his sensibility towards pain and grief, and lastly, not least, his present mental and bodily state of health. Sir Richard Baker (1568-1645) said, "Health is the wealth of wealth"; and Ralph Waldo Emerson's exclamation—"Give me health and a day, and I will make the pomp of kings and emperors look ridiculous"—conveys much the same meaning as Martial's well-known line, "Non est vivere sed valere vita."[1]

I have alluded[2] elsewhere to the English finger-ring inscription—"Breath paine, Death gaine"—and to the great fresco painting (fourteenth century) of the "Triumph of Death" in the Campo Santo of Pisa, where the poor and wretched are represented praying to die, but invoking death in vain. The same idea is expressed on the fifteenth-century fresco of the "Triumph of Death" in the Palazzo Sclafani at Palermo. There Death is represented triumphing over pope, kings, and the great of the world. With his darts he has just struck down a lady and a youth in the midst of social festivities, but the poor and wretched implore him in vain to release them from their misery. With such ideas and designs the following Latin inscriptions on sundials might be compared: "Afflictis lentae, celeres gaudentibus horae," and "Felicibus brevis, miseris vita longa." Cf. also: "O Death, acceptable is thy sentence unto the needy, and unto him whose strength faileth, that is now in the last age, and is vexed with all things, and to him that despaireth and hath lost patience" (Ecclesiasticus xli, 2); "It is better to die once for all (ἅπαξ) than to suffer all our days" (Aeschylus, *Prom. Vinct.*, lines 769, 770); and various epigrams from the "Sinngedichte" (seventeenth century) of Friedrich von Logau:—

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[1] This hendacasyllabic line from Martial ("Epig." vi, 70, 15) was adopted as a motto by the Royal Medical and Chirurgical Society of London (afterwards merged into the Royal Society of Medicine); but, like many aphorisms, it is neither true in the literal sense nor altogether true in the sense which was originally intended—namely, "Real life is the being in health, not merely the being alive." How far, in this latter sense, it is a true saying depends, of course, on what is meant by "health" and "real life." Some persons are satisfied with life, and make it not only enjoyable to themselves but even useful to others, though they can hardly be said to possess "health." To such persons, indeed, it seems as if, owing to their physical deficiency, more of the stream of vital energy has been directed into intellectual channels, thus increasing their powers of observation, their love of Nature, their sympathy with others, and their highest mental enjoyments of life.

[2] *See* F. P. Weber, loc. cit., p. 123.

> "Ich fürchte nicht den Tod, der mich zu nehmen kümmt;
> Ich fürchte mehr den Tod, der mir die meinen nimmt."
>
> "Tod ist ein langer Schlaf; Schlaf ist ein kurzer Tod.
> Die Noth, die lindert der, und jener tilgt die Noth."
>
> "Der ärgster Tod ist der, der gar zu langsam tödtet;
> Die ärgste Noth ist die, die gar zu lange nöthet."
>
> "Der Tag hat grosse Müh, die Nacht hat süsse Ruh;
> Das Leben bringt uns Müh, der Tod die Ruhe zu."

The last couplet may be compared with the well-known lines of Heinrich Heine:—

> "Der Tod, das ist die kühle Nacht,
> Das Leben ist der Schwüle Tag.
> Es dunkelt schon, mich schläfert,
> Der Tag hat mich müd' gemacht."

It is, however, by no means true that aged infirm persons and weary labourers, who believe they are tired of life, always welcome the approach of death. Amongst ancient writings, Aesop's fable of "Death and the Woodcutter" may be remembered in this connexion, and so may the passage in Homer's "Odyssey" (Book xi), where the shade of Achilles in the nether world tells Ulysses that it were better to be a poor labourer's hireling amongst the living than a king amongst the dead. Compare also La Fontaine's fable, "La Mort et le Mourant"; in his "La Mort et le Bûcheron" he writes:—

> "Plutôt souffrir que mourir,
> C'est la devise des hommes."

J. S. Le Fanu, in a beautiful passage of one of his best known novels, likens the unwillingness of the old persons to die and their clinging to a sometimes even painful life to the unwillingness of tired-out children to say good-night and go to bed; and on the same subject one may call to mind the lightly written introductory chapter of Claude Tillier's ever-popular novel, "Mon Oncle Benjamin." Thomas Moore's lines ("Odes of Anacreon") were, however, not meant to refer specially to aged persons—

> "Still as death approaches nearer,
> The joys of life are sweeter, dearer."

A great deal has been written by ancient and modern authors in various languages and in various parts of the world to remedy unreasonable fear and to offer consolation for the idea of one's own approaching death and for the death of one's friends. Fortunately (as already mentioned), the near approach of natural death is generally by no means so terrible to the dying individual himself as it is still popularly supposed to be, and as it often is to his loving friends at the death-bed. All physicians, nurses, and others, whose duties have necessitated their frequent presence at death scenes, more or less strongly corroborate this statement; and to support it I need only refer, amongst others, to the writings of Sir Henry Halford, Sir Benjamin Brodie, Sir W. S. Savory,[1] Sir William Osler,[2] Professor H. Nothnagel,[3] and Professor C. A. Ewald,[4] as well as to Colonel T. H. Lewin's work, "Life and Death: being an authentic Account of the Deaths of One Hundred Celebrated Men and Women," Lond., 1910. Very different is all such testimony from many modern ideas about "last hours" ("Mourir n'est rien, c'est notre dernière heure!"), and from those suggested by the illustrations of the "Ars Moriendi" (the mediæval religious handbook on how to "die well,") and other orthodox teaching of the mediæval Christian Church.

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[1] *See* "On Life and Death," Lond., 1863, p. 178.

[2] *See* "Science and Immortality," Lond., 1904, p. 36.

[3] *See* "Das Sterben" (2nd ed., Vienna, 1908, p. 52) by Professor Hermann Nothnagel. His own last illness in 1905 was apparently attended by much distress, but in "angina pectoris," from which he suffered, the ending is sometimes so sudden that, in reference to it, Sir W. Osler (in one of his writings) has quoted Newman's lines on the sudden death of his mother:—

> "One moment here, the next she trod
> The viewless mansions of her God."

Nothnagel kept a diary of his last hours, and another medical sufferer from "angina pectoris," Dr. G. H. R. Dabbs (died 1913), did so also.

[4] Ewald, "Ueber Altern und Sterben," 1913, p. 30.

John Bale, Sons & Danielsson, Ltd., 83-91, Great Titchfield Street, London, W.

This paper was read at the Seventeenth International
Congress of Medicine, London, August 1913.

With kind regards
F. P. W.

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[Tuesday Afternoon, August 12]

SECTION XXIII

HISTORY OF MEDICINE

INDEPENDENT PAPER

ILLUSTRATIONS OF INFORMATION FURNISHED BY MEDALS, SMALL BRONZES, &c.

By F. PARKES WEBER, M.D., F.R.C.P., F.S.A.

I BELIEVE that apart from the portrait medals of physicians, surgeons, scientists, &c., the medical interest in numismatics has been overestimated. An appeal to coins and medals, however, frequently confirms or illustrates some already known or surmised detail. Occasionally coins and medals and other old metallic 'documents' furnish the only evidence forthcoming in regard to some point of interest. I have ventured to bring before you to-day a few examples illustrating the kind of, and sometimes scantiness of, information on various subjects to be derived from an appeal to medals, small bronzes, &c.

Baron de Witte, in the *Mémoires de la Soc. des Antiquaires de France* for 1869 (vol. xxxi, p. 168), referred to a small votive bronze figure found near Soissons, in the Department Aisne, France. It represented an emaciated man seated on a stool, and bore the dedicatory inscription: ΕΥΔΑΜΙΔΑϹ ΠΕΡΔΙΚ(ΚΟΥ ΑΝΕΘΉΚΕ); and had been already figured by A. de Longpérier in the *Revue Archéologique* for 1844 (Paris, First Series, vol. i, Plate XIII). It was evidently a votive offering dedicated by the man whose name is inscribed on it, who must have been afflicted by some wasting disease. The existence of such a figure, to my mind, undoubtedly throws light on a curious passage in the *Description of Greece* (Book X, on Phocis, chap. ii. 4) by Pausanias, in the second century A.D., but I find that Baron de Witte in his communication above referred to already recognized and specially drew attention to this.

I will quote the passage from J. G. Frazer's translation of Pausanias's work (London, 1898, vol. i, p. 501): 'Scarcely, it is said, had he (Phaylus) entered on the command when he saw a vision in a dream, and it was this. Amongst Apollo's votive offerings (at Delphi) was a bronze effigy of a mouldering corpse, the flesh all wasted away, nothing left but the bones. It was said by the Delphians to be an offering of Hippocrates, the physician. Now in his dream Phaylus thought that he resembled this effigy; and immediately he was attacked by a wasting sickness that fulfilled the augury of the dream.' There can scarcely be a doubt that the bronze figure referred to represented a man wasted by disease almost to a skeleton, and was a votive or thank offering (ἀνάθημα or *donarium*) dedicated by the sick man after or in hopes of recovery.

Another illustration that I have chosen relates to Dr. Wenzel Beyer or Payer or Bayer (1488–1526), the author of the first medical treatise on the thermal waters of Karlsbad in Bohemia. By being practically the first to recommend patients to take the waters internally he must have enormously increased their utility. In his book above referred to, *Tractatus de thermis Caroli IV*, &c., Leipzig, 1521, he wrote: 'I have said that this water must be drunk. As, however, till now it has seldom been used for drinking, but more for bathing, what I have said will appear to many as something new.' Beyer was born at Elbogen near Karlsbad, as appears from the title-page of his book, where his name is given as Venceslaus Payer *de Cubito*, that is to say, of Elbogen. Not much more would be known or surmised about Beyer were it not for the existence of two medals commemorating his death in 1526, examples of both of which exist in the Imperial Collection at Vienna. I will shortly describe them.

Like most German portrait medals of the time they are doubtless the work of some goldsmith and are both cast and chased in silver. The first one (diameter 2·2 inches) bears on the obverse the portrait of Beyer, in profile to left, at the age of 38 years, with the inscription: WENCES BEYER, &c. On the reverse, in a bare landscape (with one tree), is a steaming chasm, into which a horseman (Marcus Curtius?) is about to plunge. In the foreground is a book, and upon that rests a skull; there are loose bones lying about; and in some specimens the date, 1526, occurs in the field. The inscription is: IAM PORTVM INVENI, SPES ET FORTVNA, VALETE. (See Fig. 1.) The more usual quotation is:

'Inveni portum; Spes et Fortuna valete!
Sat me lusistis, ludite nunc alios.'

that is to say, 'I have found the haven; Hope and Fortune, farewell! You have made sport enough of me, now make sport of others.' It is said to be the translation of a Greek epitaph, ascribed to Janus Pannonius, also to Prudentius (see W. Gurney Benham, in his Cassell's *Book of Quotations*, p. 568). The reverse type certainly suggests a reference to Marcus Curtius, the Roman legendary hero, who, when he heard that the chasm in the Forum could only be filled by throwing Rome's greatest treasure into it, mounted his horse and leaped into the abyss, declaring that Rome possessed no greater treasure than a brave and gallant citizen.

The second medal (diameter, 2 inches) bears Beyer's bust on the obverse, with a similar inscription to that on the obverse of the first medal, but the portrait is nearly a full-face one. The reverse represents a bier, standing on stony ground, with a decaying corpse stretched at full length upon it. Above this is the inscription in four lines: CVM PARITER OMNIBVS MORIENDVM NON TARDE SED CLARE MORI OPTANDVM. ('Since all alike must die, it is desirable to die not tardily but illustriously.') On the field of the reverse is the date 1526.

Nothing seems to be known with certainty as to the cause of Beyer's death, but the reverse designs on these two medals, especially that referring to the legend of Marcus Curtius, suggest that his death was the result of (or, at the time, supposed to be the result of) an injury or disease acquired when examining the source of the great hot spring (' Sprudel ') at Karlsbad. At the present day, close to the Sprudel, along the sides of the river Tepl, clouds of steam arise from the ground itself. The rocky ground on which the bier stands (in the second medal) probably represents the bed of the Tepl, and the book (on the first medal) is probably an allusion to Beyer's book on the Karlsbad springs. Beyer's patron, Count Stephan Schlick, to whom he dedicated the treatise in question, was hereditary Lord of Elbogen, and doubtless owned Karlsbad itself. Therefore, Beyer's book, by increasing the use of the thermal waters, was probably of some financial service to the Schlick family, who apparently had these commemorative medals made. They are, as already stated, made in the ordinary manner of the period, that is to say, cast and chased, probably the work of some goldsmith patronized by the Schlick family. Count Stephan Schlick himself was one of those who perished with their sovereign, King Louis II of Hungary (and Bohemia), in the disastrous battle against the Turks (under Soliman II) at Mohacs on August 29, 1526. It was by this Count Stephan Schlick and his brothers that the large silver

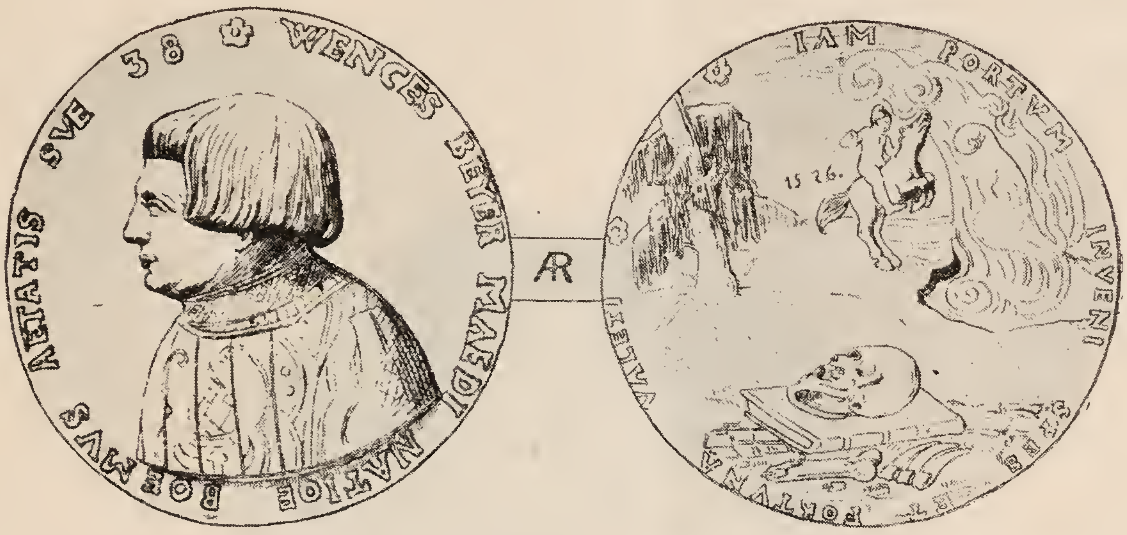
AETATIS SVE 38 WENCES BEYER MAEDI NATIOE BOEMVS
AR
IAM PORTVM INVENI SPES ET FORTVNA VALETE
1526

FIG. 1.

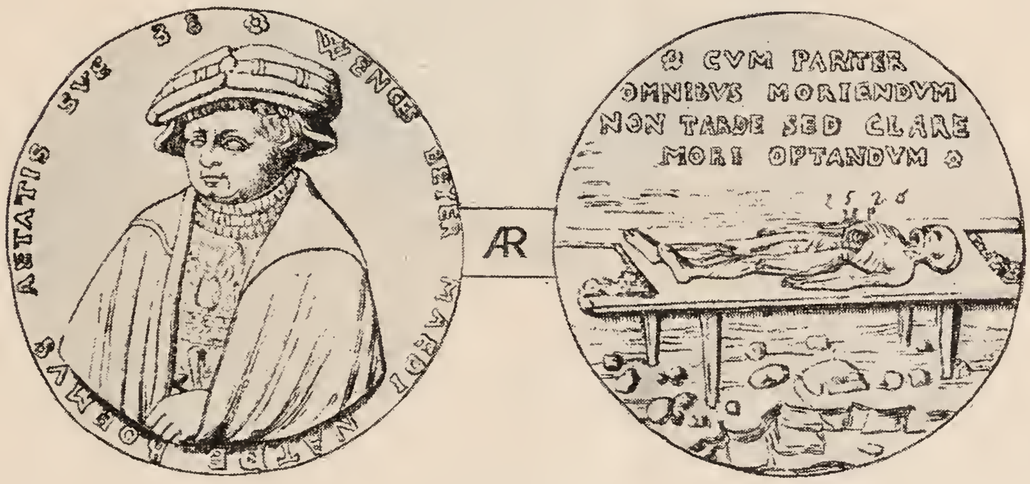
AETATIS SVE 38 WENCES BEYER MAEDI NATIOE BOEMVS
AR
CVM PARITER OMNIBVS MORIENDVM NON TARDE SED CLARE MORI OPTANDVM
1526

FIG. 2.

coins were issued at Joachimsthal, called *Joachimsthaler*, from which the words *thaler* and *daler* and *dollar* are derived.

The correct explanation of the types on these medals is chiefly due to J. de Carro, who wrote an account of them in a Karlsbad almanac published at Prague in 1841 (to which my attention was kindly drawn by Dr. Paul Mayer)—and, I believe, in an earlier work, in the French language, on the Karlsbad waters—and to Joseph Bergmann, who described them at length in his work, *Medaillen auf berühmte und ausgezeichnete Männer*[1] *des Oesterreichischen Kaiserstaates*, published at Vienna in 1844. Bergmann, in this connexion, aptly quotes Ovid (*Fast.* Lib. iv, 709), 'Factum abiit; monumenta manent.'

Philetærus, the founder of the kingdom of Pergamus, was a eunuch, and one might ask whether his portrait on coins resembles that of a eunuch.

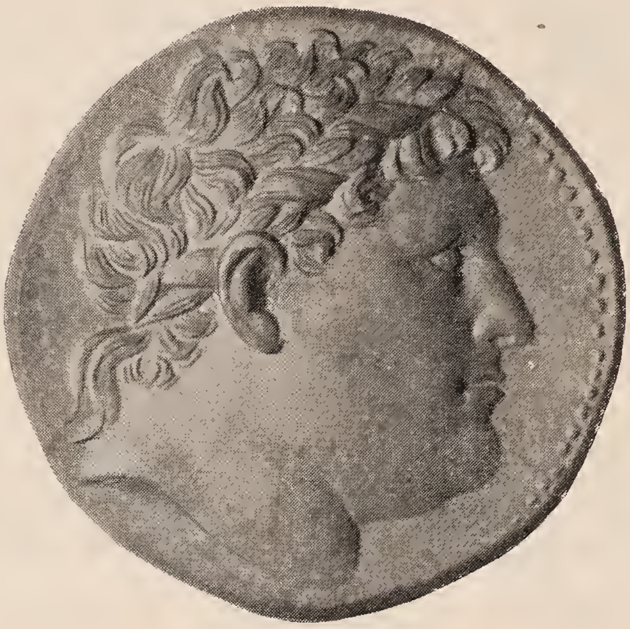

FIG. 3.

His portrait, sometimes in a magnificent style of medallic art (as on the tetradrachm illustrated), appears on the coins of his nephew and successor, Eumenes I (B.C. 263–241), and certainly does fairly well accord with the supposition that he was a eunuch (see Fig. 3, for which I am indebted to the kindness of Mr. G. F. Hill). It must be admitted, however, that neither this paragraph nor my next one belongs, strictly speaking, to the subject of medicine.

The Byzantine Emperor, Constantine IV (668–85), surnamed 'Pogonatus' on account of the enormous growth of his beard during a military expedition, is never represented on coins with an extraordinarily large beard. On the other hand, on some (common) gold coins, the portrait of his father, the Emperor Constans II (641–68), has the largest beard and moustaches, I believe, that have ever been represented on coins or medals. Therefore, though 'Pogonatus' is not himself conspicuous for his beard on his coin-portraits, the coin-portraits of his father suggest a family potentiality to the growth of enormous beards and moustaches.

---

[1] This title reminds me of a remark by the great surgeon, Billroth, in regard to collections of medals of 'famous' and distinguished physicians and naturalists: that the medals in such collections were chiefly, not of distinguished and well-known, but of forgotten, obscure, or absolutely unknown, physicians and naturalists.

Some of the gold coins of Samudragupta, the Indian king who reigned A.D. 337 to 380, represent on one side the king standing, holding the axe of Kritanta (that is to say, the ' End-maker ' or Death). This ' battle-axe type ' of coins was meant to signify that the king in question was as great a conqueror as Death himself, for the surrounding inscription means : ' Wielding the axe of Kritanta, he conquers even invincible kings.' There are other coins commemorating Samudragupta's successes in the arts of war and peace, his wonderful conquering campaigns and his musical attainments. One would think that such a man must have suffered from a kind of ' megalomania ', but his conquests were real, and he had a long and prosperous reign. This brings one to the whole hitherto unexplored subject of indications of mental abnormality or peculiarity furnished by coins, medals, &c. In this regard W. W. Ireland (*The Blot upon the Brain*, 2nd edit., p. 116, Edinburgh, 1893) referred, for an example, to the forced currency of Muhammad ibn Taghlak, Sultan of Delhi (A.D. 1324–51), but the idea of such a *token currency* seems to have been a perfectly sane one (cf. Stanley Lane-Poole, *The Coins of the Sultans of Delhi in the British Museum*, 1884, introduction, p. xxi).

The following ' memento mori ' medal of Virgil, though not in any way strictly medical, may be mentioned here as recalling the remarkable tradition of Virgil's magical powers, &c., in the middle ages. The obverse bears a profile bust of Virgil to left, in mediæval dress, wearing barette, between the letters P (for Poeta) and O (for Orator) ; below this is the name VIRGILIVS ; the whole is within an ornamental circle. Outside this circle is the inscription in Gothic letters :

' Mantua me genuit, Calabri rapuere, tenet nunc
Parthenope. Cecini pascua, rura, duces.'

Following this inscription is the fanciful date 113ℓ (=1134). (See Fig. 4.)

The reverse represents the head and neck (skull, spinal column, collar-bones) of a skeleton facing, in an ornamental circle. The skull is being ' eaten by worms ', and has a thighbone between its jaws ; remnants of neck muscles are indicated. Inscription in Gothic letters : ' Quod sumus, hoc eritis, fuimus quandoque quod estis.' (See Fig. 5.)

A fine specimen from the Bernal collection, in silver gilt (diameter, 2·6 inches), cast and chased, is in the Victoria and Albert Museum, London (from this specimen my illustrations were obtained), and another specimen has been described in *L'Arte* (Rome, 1907, vol. x, p. 449, and 1908, vol. xi, p. 56).

The whole type of this medal must refer to Virgil's reputed tomb at Naples, over which (according to Donatus's account) was engraved the inscription, ' Mantua me genuit,' &c. In mediæval times and later this tomb constituted one of the greatest sights for visitors to Naples. The date (1134) on the medal probably refers to the alleged original discovery by an Englishman (as narrated by Gervase of Tilbury in his *Otia Imperialia*) of the poet's bones, inside a mountain, in the reign of Roger of Sicily (*vide* Domenico Comparetti, *Vergil in the Middle Ages,* English translation by E. F. M. Benecke, London, 1895, p. 273). I am indebted to Mr. G. F. Hill for information on the subject. On the whole question of the tomb of Virgil see also R. T. Günther, *Pausilypon, &c.* (Oxford University Press, 1913).

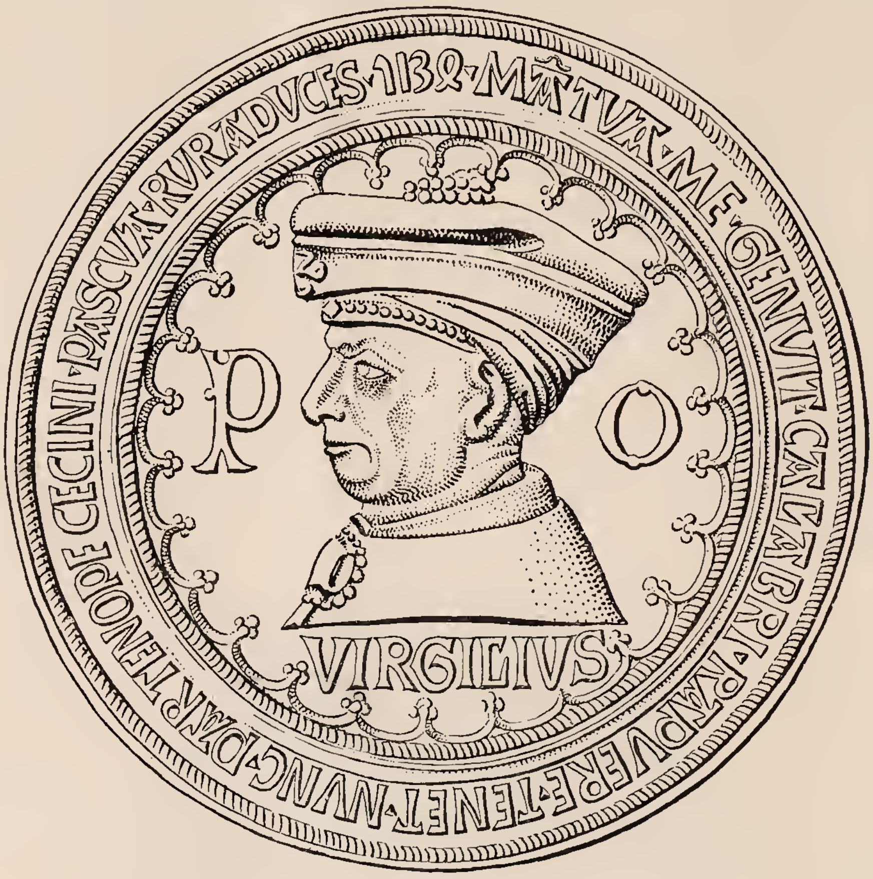
MANTVA·ME·GENVIT·CALABRI·RAPVERE·TENET·NVNC·PARTENOPE·CECINI·PASCVA·RVRA·DVCES·1BQ·
P
O
VIRGILIVS

FIG. 4.

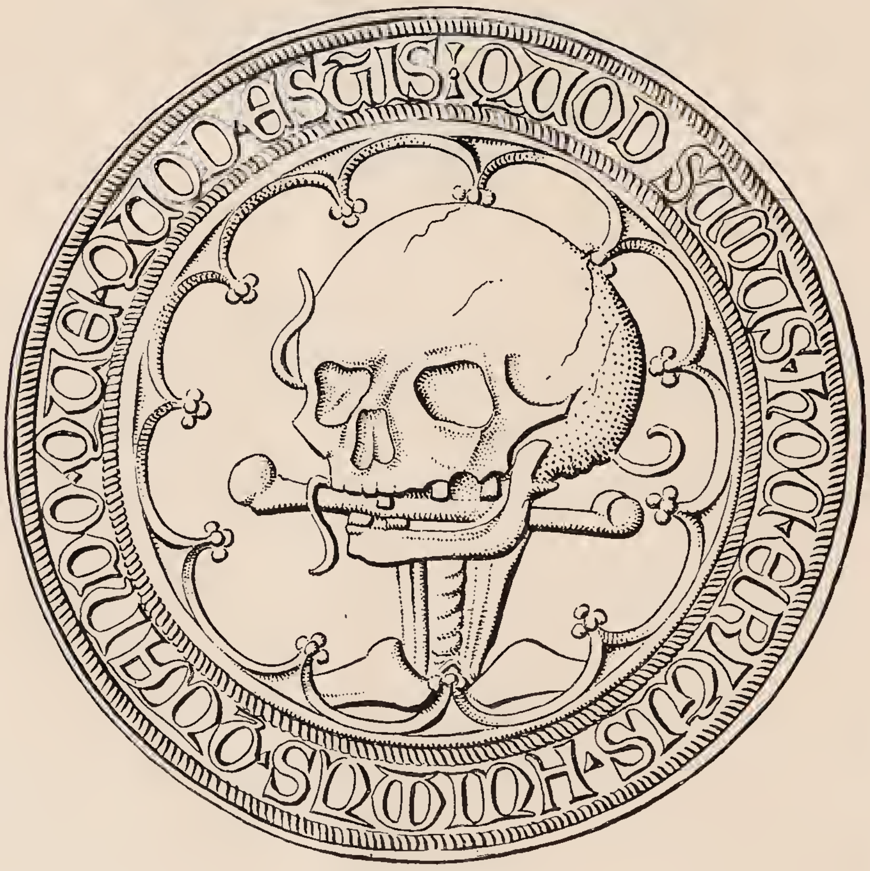

FIG. 5.

An earlier date than the fifteenth century can hardly be admitted for this medal, which appears to be the work of a good goldsmith, but a poor artist. It was perhaps made to be ‘planted’ at Naples and sold as a valuable, if not magical, relic to rich and credulous, though possibly lettered, travellers of the period. The whole idea of the medal is analogous to that of the so-called *gisant* class of sepulchral monuments, which did not come into existence before the fifteenth century (a good example in England is the tomb in Canterbury Cathedral of Archbishop Chichele, who died in 1443). Cf. F. P. Weber, *Aspects of Death in Art and Epigram*, second edition, London, 1914.

In conclusion I wish to show five small bronze Greek coins (kindly lent me from my father's collection) of the island of Cos, of the first and second centuries A.D. One of them, probably of the first century, has the bust of Hippocrates on the obverse; another, of about the same period, or slightly later, has the head of Heracles on the obverse and a figure of Hippocrates seated on the reverse. The other three have a portrait of the physician, Xenophon, on the obverse; one (probably of the first century), with the legend ΞЄΝΟΦΩΝ ΙЄΡЄΥϹ, shows that Xenophon was also an Asclepian priest; two are of rather later style, probably of the second century, and bear the physician's name on the portrait side without the title ΙЄΡЄΥϹ. Not much is known of this Xenophon, but according to the notice in Smith's *Dictionary of Greek and Roman Biography*, he was a native of Cos, a descendant of the family of the Asclepiadæ, and a physician to the Emperor Claudius. Xenophon obtained from Claudius certain privileges for his native island. ‘He was afterwards induced by Agrippina to murder the Emperor by means of a poisoned feather, which he introduced into his mouth under the pretence of making him vomit, A.D. 54.’ Such a statement should obviously not be accepted without great hesitation, if, indeed, it can be accepted at all.

WEGNER

ÜBER HEPAMULTBEHANDLUNG VON ANÄMIEN UND SCHWÄCHEZUSTÄNDEN

Von Dr. Häuer, Nienburg/Weser

Autoreferat nach: „Zentralblatt für Landärzte“ 1936, Nr. 27

Die Entdeckung der Lebertherapie für die Behandlung der Anämien gehört wohl unzweifelhaft zu den wichtigsten Ergebnissen der Medizin des letzten Jahrzehnts. Ganz besonders hat die perniziöse Anämie, der die Ärzte noch vor wenigen Jahren machtlos gegenüberstanden, viel von ihrem Schrecken verloren. Wir Ärzte werden der pharmazeutischen Industrie stets zu Dank verpflichtet bleiben, daß sie uns in kurzer Zeit im Kampf gegen die Anämien sehr wertvolle Präparate in die Hand gegeben hat und daß sie sich auch jetzt noch dauernd bemüht, diese Präparate zu verbessern.

In erster Linie war man bestrebt, Leberpräparate herzustellen, die sich zwecks schnellerer Wirkung und genauerer Dosierungsmöglichkeit für die parenterale Therapie eignen; ein durchaus verständliches Vorgehen, um so mehr, als sich diese Präparate fast unbegrenzt halten. Daneben kommt den peroral anwendbaren Leberpräparaten eine große praktische Bedeutung zu. Vielfach werden von dem Kranken direkt Mittel gewünscht, die er „einnehmen" kann. Man wird daher, wo dies ohne Nachteil für den Kranken möglich ist, ohne Bedenken den peroralen Weg wählen können.

Als ein peroral einzunehmendes Präparat, das ebenfalls unbegrenzt haltbar und ganz hervorragend wirksam ist, hat sich in meiner Praxis seit Jahren das Hepamult erwiesen; es stellt schwarzbraune, grobgekörnte, dem Aussehen nach an Cachou erinnernde Granulen dar. Wegen seines guten, etwa schokoladenartigen Geschmackes wird es von jedem Kranken, ganz besonders von Kindern, gern genommen. Es wird dreimal täglich in der Dosis von 1 — 2 Teelöffeln mit etwas Wasser, Tee, Kakao oder Kaffee verabreicht (nicht kauen!) und entfaltet sehr bald seine segensreiche Wirkung, die oft schon nach wenigen Tagen auftritt und in einem schnell sich bessernden Blutbild und in deutlicher Zunahme des Blutfarbstoffgehalts und des Appetits zum Ausdruck kommt.

Ich gebe Hepamult, das nicht nur spezifisch auf die Blutneubildung wirkt, außer bei ausgesprochenen Anämien besonders gern auch bei und nach Infektionskrankheiten (Pneumonie, Typhus und Paratyphus), da ich beobachten konnte, daß hierdurch dem Kräfteverfall vorgebeugt und die Rekonvaleszenz beschleunigt wird.

Med. Mitt. 1936 S. J. 6

Als wertvolles Mittel hat sich das Hepamult in meiner Praxis ferner bei Ulcus ventriculi oder duodeni erwiesen, wo es neben der strengen Ulcuskost ohne Beeinträchtigung der spezifischen Behandlung gereicht werden kann und ganz wesentlich dazu beiträgt, die infolge der monotonen Schonkost oft in ihrem Blutstatus heruntergekommenen Kranken schneller zu Kräften zu bringen. Die strenge Ulcuskur wird dadurch in keiner Weise beeinträchtigt. — Auch die Säurebildung wird durch Hepamult nicht ungünstig beeinflußt. Setzt man rechtzeitig mit der Hepamultbehandlung ein, dann kommen die Ulcuskranken in ihrem Blutstatus gar nicht erst so herunter wie früher. Ich verordne das Leberpräparat mit Vorliebe den vielen Patienten vom Lande, da sie dadurch die Möglichkeit haben, sich häufige Reisen zum Arzt, die mit Kosten, Beschwerlichkeiten und Umständen verbunden sind, zu ersparen.

Nach meinen Erfahrungen ist Hepamult ein Mittel, das Arzt und Patienten von der unbeliebten Spritze befreit oder zumindest die Injektionsbehandlung weitgehend entbehrlich macht.

ZUR GESCHICHTE DER OVARIALFOLLIKEL UND IHRER ABBILDUNGEN

Von Prof. Dr. med. et phil. Richard N. Wegner, Frankfurt a.M.

Die Entdeckung zweier Ovarialhormone, des auf den weiblichen Gesamtorganismus wirkenden, die Herausprägung seines Sexualtypus stimulierenden Follikelhormons sowie des Gelbkörperhormons, hat den Blick auch wieder rückwärts gelenkt auf Anschauungen, die man sich einst über die Follikelbildung des Eierstockes vor Aufkommen der Zellenlehre und vor Ausbildung der Mikrotomtechnik machte.

Von der besonders von Albrecht v. Haller (1708—1777) vertretenen Idee ausgehend, daß sich das Ei erst aus einer Flüssigkeit bilde, war man im 18. Jahrhundert eher geneigt der Follikelwand Drüsenfähigkeiten zuzuschreiben, als sie als Eiträger zu betrachten. Das erste Viertel des 19. Jahrhunderts hat sich, nach der Auffindung des Eies durch Karl Ernst von Baer (1827)*), mit der Erkenntnis begnügt, in dem Follikel des Ovariums eine Wachstumsstätte des Eies zu sehen, in dem das Ei als morphologische Einheit von dem Follikel nur umschlossen wird. Mit der Ansicht, das Contentum des Folliculus diene nur der mechanischen Austreibung des Eies, kamen Forscher wie Gabriel Günter Valentin**) (Breslau 1810—1883 Bern) davon ab, der Follikelwand noch eine weitere Bedeutung zuzuschreiben, „der Inhalt des Folliculus sei unmittelbar nach der Befruchtung von höchst untergeordnetem, vielleicht von gar keinem Einfluß". Auch vor Aufkommen des Gedankens einer inneren Sekretion und ihrer Fernwirkung auf dem Blutwege kam

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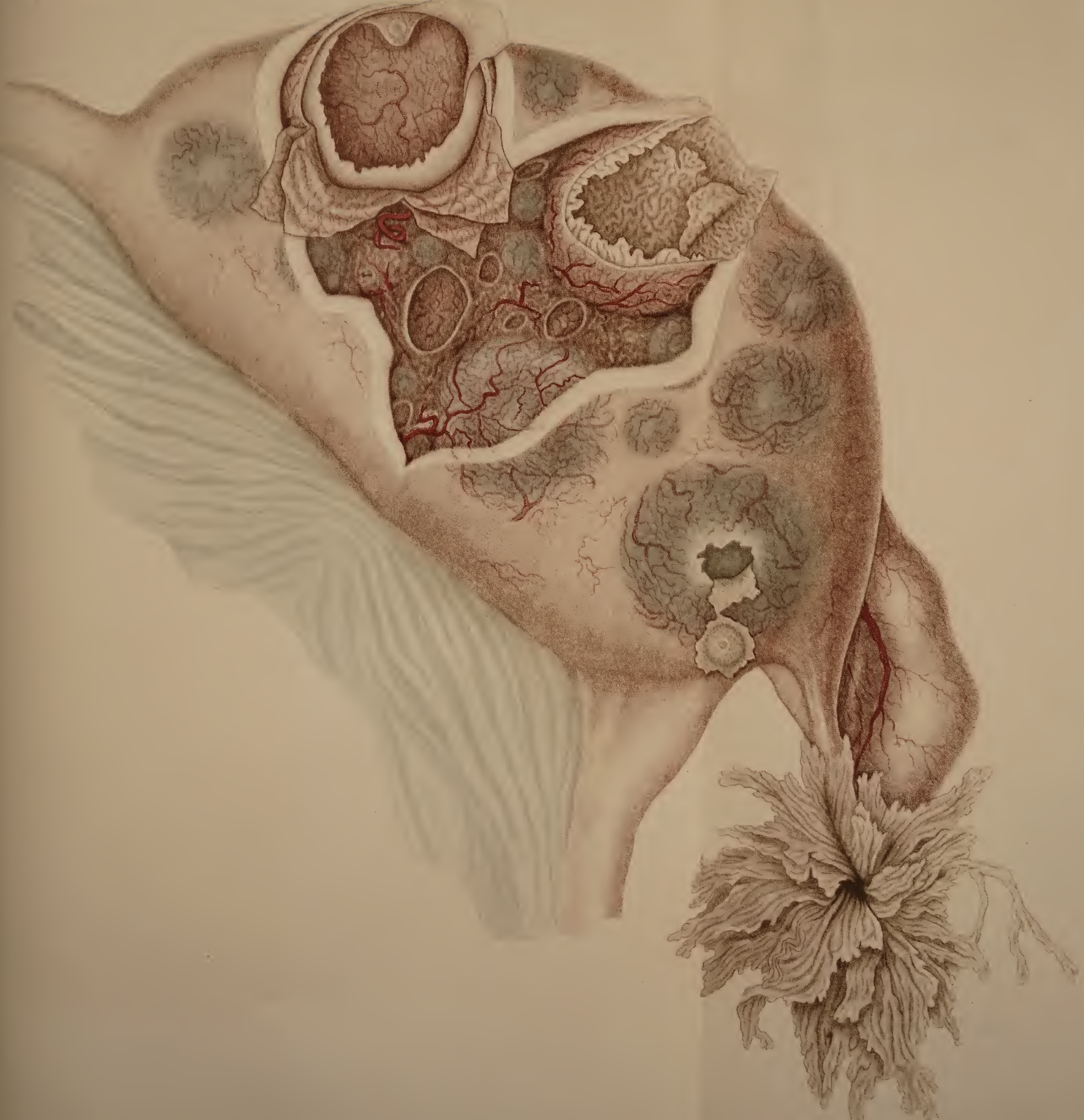
*) Vergleiche: Englert, Ludwig. Die Entdeckung des Säugetiereies im Lebensplan Karl Ernst von Baers. Med. Mittlg. 1935, Nr. 1, S. 16—22.

**) Valentin, G. Handbuch der Entwicklungsgeschichte des Menschen. Berlin (bei August Bücker) 1835, Seite 41.



OVARIUM GEGEN ENDE DER MENSTRUATION

Nach M. Coste, «Développement des corps organisés», Atlas, Paris 1847,
Tafel I, Figur 1

Med. Mitteilungen, Jahrg. VIII, Heft 6

man in dem Bestreben, die Bildungsstätte des Eies genauer zu erforschen, zu beachtlichen Folgerungen und zu Abbildungen der Follikel von immer größerer Genauigkeit. Wie immer in der Geschichte der Naturwissenschaften ist mit dem Fortschreiten der Erkenntnisse zugleich eine kunstgeschichtliche Parallele in der Verbesserung der Abbildungskunst zu beobachten, von den alten holländischen Stechern über die Blütezeit des englischen Kupferstiches am Ende des 18. Jahrhunderts bis zu der vollendeten Bildwiedergabe französischer illustrierter Werke in der ersten Hälfte des 19. Jahrhunderts, die zuletzt in farbigen Lithographien einen Höhepunkt erreichten. Die Zahl der durch brauchbare Abbildungen gekennzeichneten Werke, soweit sie Zustände des Ovariums darstellen, ist klein. Als Beispiel aus dem 17. Jahrhundert bringen wir eine von Regner de Graafs Abbildungen, die auf Einzelheiten des Ovars eingeht (Abb. 1). Bläschen im Bau der weiblichen Testes hatte schon Vesal gesehen. Stensen*) wandte den Namen Ovarium dafür an. Regner de Graaf gebrauchte noch beide Namen. Sein Werk über die Ovarien (s. Abb. 1, Erläuterungen am Schluß dieser Arbeit) stellt einen wirklich bedeutenden Fortschritt in der Erkenntnis der weiblichen Zeugungsorgane dar und eilt ein Jahrhundert voraus. Graaf (Schoenhoven 1630—1693 Delft) hat seine wertvollen Beobachtungen über das Ovarium in zwei Schriften niedergelegt: Epistolae ad L. Schacht de nonnullis circa partes genitales inventis novis (Leyden 1668) und de mulierum organis generationi inservientibus, tractatus novus (Leyden 1672).

Die Ergebnisse seiner für die Zeit ganz großartig genauen und sorgfältigen Versuche über die Folgen der Befruchtung bei Säugetieren sind etwa: ½ Stunde nach der Begattung hatten sich die Eibläschen im Eierstock noch nicht verändert, höchstens an Durchsichtigkeit verloren. Nach 6 Stunden fand er die Folliculi röter und eine zähe durchsichtige Flüssigkeit enthaltend. Vom Samen (die Samentierchen wurden erst 1677 entdeckt) war in den Tuben noch keine Spur wahrzunehmen. Nach 24 Stunden ragte an der Oberfläche der Follikel eine kleine Warze empor. Aufgeschnitten zeigte sie innen eine geringe Menge einer durchsichtigen Flüssigkeit, umgeben von einer dicken rötlichen Masse. Nach 27 Stunden umfaßten die Tubentrichter den Eierstock. Beim Zerdrücken eines Follikels entleerte sich zuerst eine rötliche Flüssigkeit, nach 48 Stunden ragten die Wärzchen auf den Follikeln noch mehr hervor. Nach 52 Stunden fand sich in den Follikeln eine drüsige Masse und in ihrer Mitte eine Höhlung ohne Flüssigkeit. Nach 72 Stunden umfaßte der Trichter die Eierstöcke ringsherum, die auf den Follikeln befindlichen Wärzchen hatten in der Mitte ein kleines Loch und bildeten in ihrem Innern eine kleine Höhlung. Die äußerst kleinen Eier befanden sich nun in den Tuben und bestanden aus zwei kugelförmigen, ineinander eingeschlossenen Membranen. Nach 4 Tagen fanden sich die Eier in den Tuben noch weiter vorgerückt. Nach 6—7 Tagen hatten die Eier bedeutend an Umfang zugenommen, ohne daß Graaf einen Embryo zu erkennen imstande gewesen wäre. Vom 8. Tage an verunglückten Graaf die Eier, weil sie schon zu fest an der Innenseite des Uterus saßen und andererseits so zart waren, daß sie bei der geringsten Verletzung rissen. In einigen Eiern von 9 Tagen zeigte sich der Embryo als ein schwaches Wölkchen. Bei 10tägigen Eiern sah Graaf schon einen Embryo. Für die meisten Untersuchungen dienten Kaninchen. Hätte Graaf ein einigermaßen brauchbares Mikroskop besessen, so

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*) Stensen, Nic. Observationes in ovo et pullo. Acta Hafniensis, Vol. III, obs. 38 p. 81.

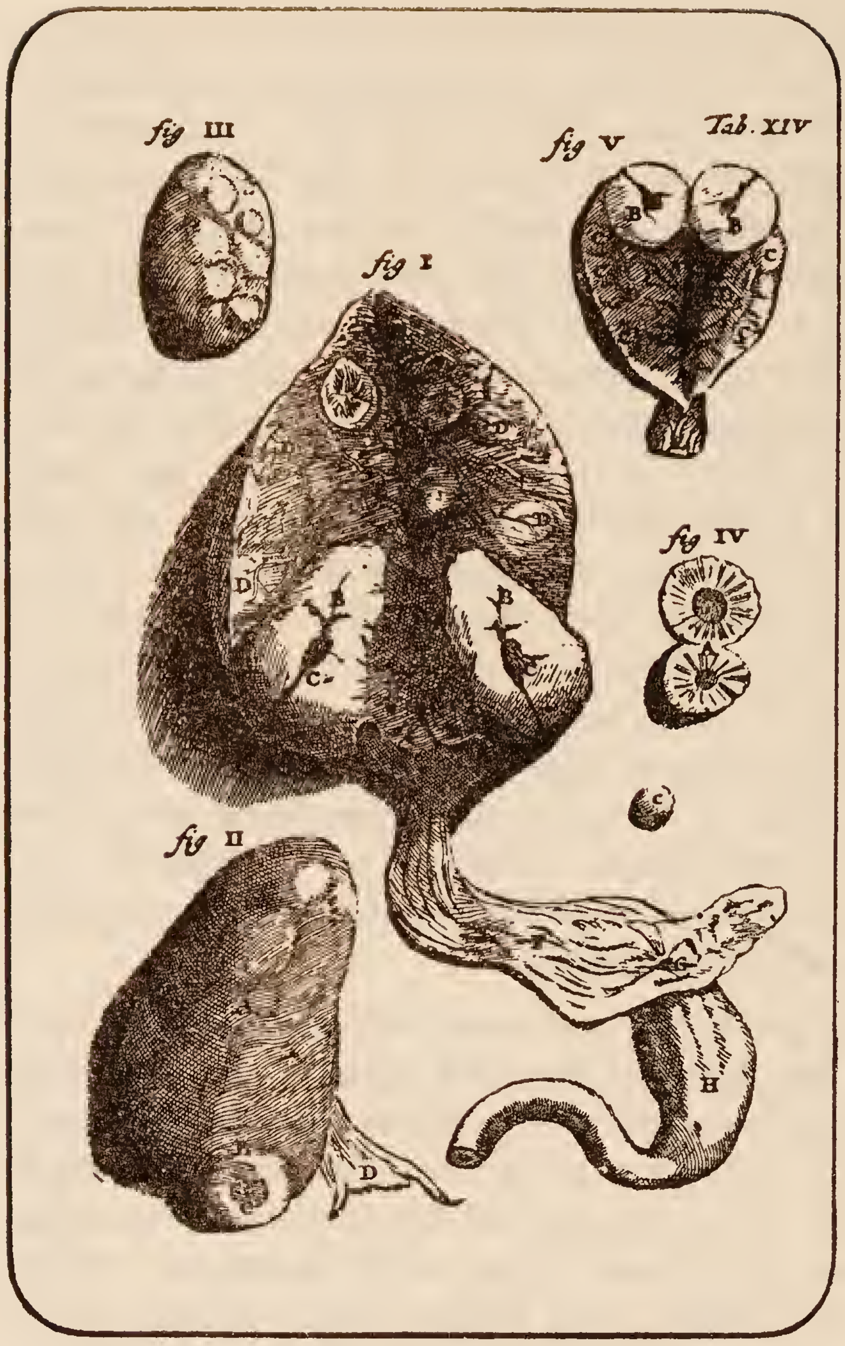

Abb. 1. Tafel XIV, aus Regneri De Graaf: De Mulierum Organis. Leyden 1672. Die verkleinerte Tafel stellt das Ovarium von Kuh und Schaf dar und zeigt Erscheinungen nach der Kohabitation und Befruchtung.

wäre wohl damals schon das wirkliche Ei im Follikel entdeckt worden. Jedenfalls sind seine Untersuchungen von einer erstaunlich fortgeschrittenen Erkenntnis. Da ihm das wahre Ei im Follikel noch unbekannt blieb, er andererseits aber die Kleinheit der Eier in den Tuben wahrnahm, so kam er zu der Annahme, das Ei der Säugetiere verkleinere sich nach der Befruchtung auf Kosten der übrigen Follikelmasse. Er hat also gewissermaßen schon auf die Herkunft des Eies aus den Follikeln nach seinem Vorhandensein in befruchtetem Zustand in den Tuben geschlossen. Da er bei seinen Methoden das Ei morphologisch nicht wahrnehmen konnte, so hat er den flüssigen Inhalt des Follikels für das Ei selbst gehalten. Daß die Bildung der Corpora lutea erst nach Ausstoßung des Eies entstehe, hat er klar erkannt. Graaf zeichnete seine Abbildungen selbst. Es ist zu vermuten, daß sie die Wiedergabe im Kupferstich an Naturtreue übertrafen, obgleich der Stecher derselben, Hendrik Bary (Gouda um 1614 — 16. II. 1707), im Porträtfach geschätzt wurde. Wir verdanken ihm die lebendigen Züge Graafs auf dem Titelvorsatzblatt seines Werkes und unter anderem ein herrliches Porträt des Admirals de Ruyter. Es war ein Rückschritt, daß man in der Folgezeit Regner de Graafs sorgfältige Beobachtungen mißdeutete und nur von rein aus dem Ovarium in die Tuben ergossener Flüssigkeit sprach, wie es Friedrich Osiander (Zell 1752—1822 Göttingen) noch im Anfang des 19. Jahrhunderts behauptete.

Unter den Abbildungswerken des 18. Jahrhunderts ragt William Hunters Werk über den schwangeren Uterus*) auch graphisch in seltener Höhe hervor. William Hunter (Lond Calderwood 1718—1783 London), der ältere Bruder von John Hunter, war ein sorgfältiger Zergliederer, von umfassendem Wissen, der sogar paläontologisch-vergleichend anatomisch über fossile Knochen gearbeitet hat. Hunter hat unter anderem eine genauere Beschreibung der Decidua gegeben, aber die Erkenntnis der Veränderungen des Ovariums nicht weitergeführt, so schön seine Abbildungen desselben im klassischen Linienstich auch sind. Den Text zu seinem

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*) Hunter, William. Anatomia uteri humani gravidi tabulis illustrata. Birmingham 1774 (weitere Ausgaben London 1815 u. 1851).

Atlas hat erst sein Schüler Baillie geschrieben. Zur Schaffung dieses Atlas konnte Hunter Mittel aus reicher Klientel, Einkünfte aus einflußreichen Ehrenstellen heranziehen. Hunter hat zu seinem Werk eine große Reihe (18) der hervorragendsten meist aus Frankreich stammenden Stecher herangezogen, darunter François Germain Aliamet (Abbeville 1734 — 1788), Pierre Charles Canot (Paris 1710—1777 Kentistown), Charles Grignion (London 1717—1810), auch als Hogarthstecher bekannt, Johann Sebastian Müller (Nürnberg 1715 bis nach 1785 London), Simon François Ravenet (London 1748 bis nach 1814) und Robert Strange (Pumona 1725—1792 London), dem Hunter in seinem Vorwort für viele Ratschläge zur besten Ausführung dankt, — um nur einige zu nennen; sie haben sich zum Teil als Porträtstecher ihrer Zeit einen hervorragenden Namen erworben. Das Geschick der Linienführung der Stecher bei einer allerdings nur äußeren Darstellung des Ovars (s. Abb. 2 und 3 sowie Erläuterungen am Schluß dieser Arbeit) läßt Hunters Werk noch heute mit einem hohen ästhetischen Genuß betrachten. Deutsche Arbeiten der Zeit, die mit Karl Ernst von Baers grundlegendem Werk (1827) so verheißungsvoll begonnen hatten, haben damals in der Abbildungstechnik keine besondere Höhe erreicht. Die besten Abbildungen finden sich demnach in französischen Werken, die staatliche Fürsorge und Förderung durch die Pariser Akademie der Wissenschaften fanden.

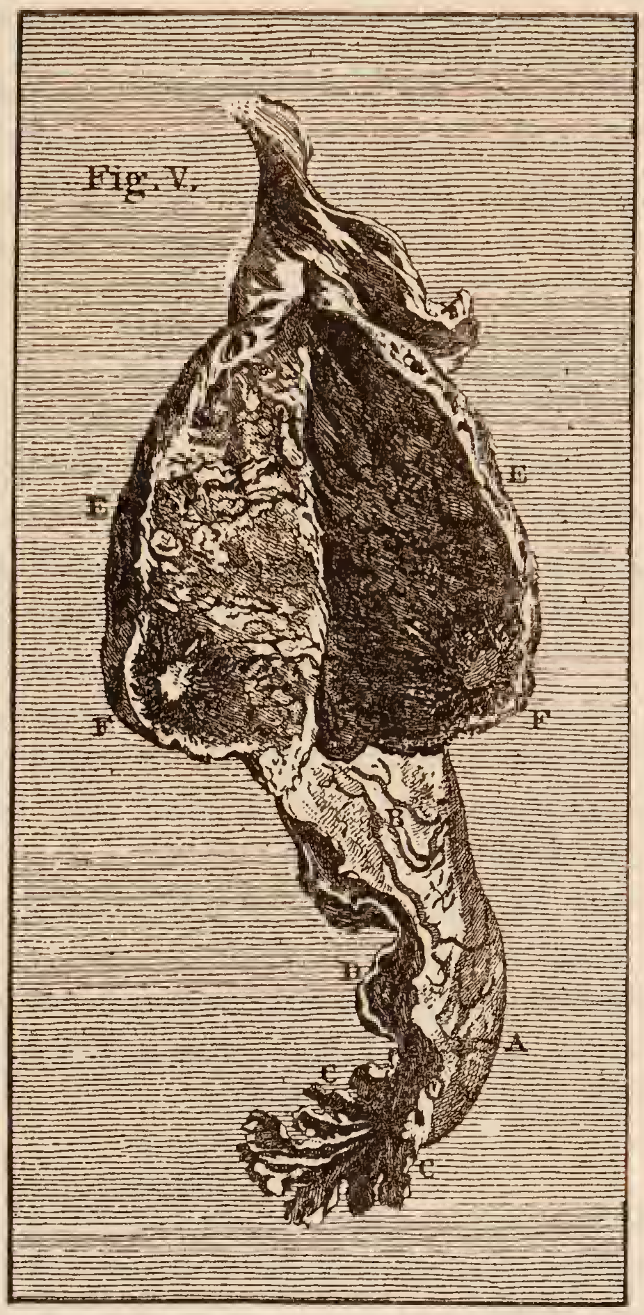

Abb. 2. Rechtes Ovar einer 2 Stunden nach der Geburt verstorbenen Frau. (Nach W. Hunter, L. c. 1774, Tafel 15, Fig. V. $^2/_3$ natürlicher Größe des Originals.)

Von eindrucksvoller Güte sind die Abbildungen der Ovarien vor und nach der Befruchtung, vor allem auch bei Menschen (Planche V), in Pouchet: „Théorie positive de l'ovulation spontanée et de la fécondation des mammifères et de l'espèce humaine, basée sur l'observation de toute série animale. Avec Atlas d. 20 planches color." Paris 1847. Georges Pouchet (26. 2. 1833 bis 31. 3. 1894) war selber ein geschickter Aquarellist. Seine Bilder sind von Oudet gestochen, der auch Jllustrationen zu Cuviers „Régne animal" geschaffen hat. Bekannter sind die Abbildungen des Embryologen Jan Jaques M. C. V. Coste. Coste (Castries, Hérault 1807 — 1873 Résenlien) studierte in Paris und empfing 1834 zusammen mit Delpech die goldene Medaille der Akademie des Sciences für seine: „Recherches sur la Génération des mammifères, suivies de recherches sur la formation

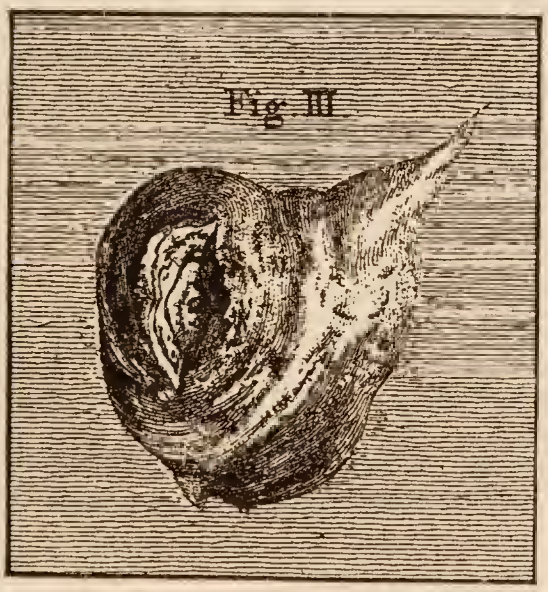

Abb. 3. Corpus luteum im linken Ovar aus dem 4. Schwangerschaftsmonat, um seinen Hohlraum zu dieser Zeit zu zeigen. (Nach W. Hunter, 1774, Tafel 31, Fig. III. $^8/_5$ natürlicher Größe.)

des embryons" (Paris 1835) mit 8 Tafeln. 1841 erhielt er einen für ihn geschaffenen Lehrstuhl der Embryologie am Collège de France. Alle seine größeren Werke zeichnen sich durch gute Abbildungen aus, am bedeutendsten ist jedoch seine: „Histoire générale et particulière du développement des corps organisés." 2 vol. Paris I., 1847, II. 1859. Aus dem dazugehörigen Atlas im Großformat von 61,5×58 cm bilden wir aus Tafel 1 das Ei im menschlichen Ovarium Fig. 1 originalgetreu ab (siehe Beilage).

Die Darstellung legt besonderen Wert darauf, die Ernährung des Follikels durch Blutgefäße und die Art ihres Platzens darzustellen. Die Lupenzeichnung unter bedeutender Vergrößerung ist nicht ganz frei von Schematismus, obgleich sie sich bemüht, die natürlichen Farben, von geringfügigen Leichenerscheinungen abgesehen, wiederzugeben. Costes Abbildungen sind vielfach kopiert worden, meist ohne die Trefflichkeit der Originale auch nur im entferntesten zu erreichen. Selbst der abbildungstechnisch so hochstehende Atlas von Bougery und Jacob „Traité complet d'Anatomie de l'Homme", Band VIII, Embryogénie, Paris 1854, Tafel 2 und 3, bleibt gerade hier einmal weit hinter den Originalen zurück.
Da Choulants „Geschichte der anatomischen Abbildung" wohl eine gute Kenntnis der Abbildungen des 18. Jahrhunderts vermittelt, aber ihre so wichtige Entwicklung in der ersten Hälfte des 19. Jahrhunderts noch nicht bringt, auch die amerikanische Ausgabe des Werkes in erweiterter Form von F. Mortimer, Chikago 1922, noch an ihr vorbeigeht, so blieben Costes Originalabbildungen weniger bekannt, als sie es verdienten.

Erläuterungen zu Abbildung 1, Seite 164:

Fig. I: Testiculus (Ovarium) der Kuh. — A. Der Länge nach aufgeschnitten. — B. Drüsige Substanz, die nach Ausstoßung des Eies im Ovarium wieder gefunden wird, in der Mitte durchschnitten. — C. Die fast verschwundene Höhle, in der das Ei enthalten war. — D. Im Ovarium enthaltene Eier verschiedener Größe. — E. Zu den Eiern ziehende Blutgefäße. — F. Gefaltete membranöse Ausbreitung der Fallopischen Tube (Fimbria ovarica). — G. Am Tubenende vorhandene Öffnung. — H. Abgeschnittener Tubenteil. — Fig. II: Noch nicht geöffneter Testiculus (Ovar). — A. Ovar. — B. Drüsige, aus dem Testikel hervorragende Substanz. — C. In ihrer Mitte vorhandenes Loch. — D. Teil der membranösen Ausdehnung der Fallopischen Tube. — Fig. III: Schafovar mit durchscheinenden, noch nicht vom männlichen Samen befruchteten Eiern. — Fig. IV: Die aus dem Schafovar entnommene drüsige Körnersubstanz, soweit sie bisher das Ei enthielt. — A. Die eröffnete Drüsensubstanz des Kügelchens. — B. Stelle, aus der das Ei entfernt ist. — C. Daraus entferntes Ei. — Fig. V: Ovarium eines Schafes, aus dem das Ei vor einigen Tagen ausgestoßen wurde. A. In der Mitte durchschnittenes Ovarium. — B. Drüsige Körnersubstanz mit ihrer beinahe verschwundenen Höhlung. — C. An der Ovarialoberfläche hängende Eier verschiedener Größe. — D. Zu den Eiern verlaufende Blutgefäße. — E. Teil des Ligamentum ovarii. Hendrik Bary (1640—1707) sculps.

Erläuterungen zu Abbildung 2, Seite 165:

A. Tube. = B. Ligament der Tube. — C. Äußere Öffnung der Tube, von den laubwerkartigen Fimbriä umgeben. Die von jeder Seite der Tubenöffnung das ganze Band entlang zwischen ihm und dem Außenende des Ovariums fortgesetzten Fimbrien. — E. Das aufgeschnittene Ovarium mit geschlängelten Arterien, die seine Substanz durchsetzen. — F. Hier, in der Substanz des Ovariums, ist das Corpus luteum zu sehen, in der Mitte durchschnitten. Kleine Gefäße erscheinen in seiner weiß aussehenden Mitte; rings um dieses Zentrum ist die Substanz sehr gefäßreich. — I. F. Rymsdyke delin. — François G. Aliamet (1734 — 88) sculps.

Erläuterungen zur farbigen Beilage:

Ovarium gegen Ende der Menstruation. Nach Coste (1847), Tafel I, Fig. 1. Natürliche Größe.
Zwei Graafsche Follikel sind angeschnitten. Der Follikel links zeigt den Discus proligerus, seine äußere und innere gefäßreiche Lage der Theca folliculi ist umgeschlagen. Zwischen den Einschnitten dieser Gewebslagen der Hauptstamm der zuführenden Arterie. Der schon gesprungene Follikel in der Mitte zeigt die Membrana granulosa Baers, die den Follikel innen auskleidet. Rechts ein künstlich angestochener Follikel, aus dem infolgedessen das Ei herausgetreten ist. Porchet sculps.

Compliments of the Author

THE PRESERVATION OF DENTAL LITERATURE IN LIBRARIES

A FUNCTION OF THE AMERICAN DENTAL LIBRARY AND MUSEUM ASSOCIATION, APPENDED TO WHICH IS A BIBLIOGRAPHY OF DENTAL BIBLIOGRAPHIES AND HISTORIES

By B. W. WEINBERGER, D.D.S., New York City

(Read before the American Dental Library and Museum Association)

"Give us men of light and learning."—*Lord Beaconsfield.*

EVERY science has its literature. For dentistry to be progressive it is necessary to be continually stepping forward from one position to another, at the same time keeping pace with the everchanging record of the discoveries and educational methods that are constantly revolutionizing it. Accurate records are as important as careful observations.

Today dental literature has become a specialty and should be so treated in all library work. It requires the attention of one who is acquainted with it, and when it receives this attention it then attains its greatest usefulness, otherwise it lies dormant, to accumulate the dust of neglect.

Few dentists are in a position to purchase many books or journals, or rather have the inclination to do so; no one has a complete library; not even a specialist is able to gather together all the books and journals of his branch of study or practice, and if such should be the case, his shelf room would soon fail him.

There is a long list of dental journals in this and other countries, and it would be folly for one individual to attempt to collect and preserve this useful material. With the ever-increasing mass of periodical literature, the capacity of a private library would soon be overburdened, for only large *public* libraries can now equal the demands for its care and preservation.

The recognized value of this material, the increased number of readers and the difficulty of acquiring it, have thus demanded the formation of public dental libraries.

A. Jacobi once wrote "A public library of 100,000 volumes makes every medical man of the neighborhood practically the owner of 100,000 volumes. By giving away you enrich a hundred or a thousand men without impoverishing yourself. No matter, however, where the library came from, by using it, you and the other men become intellectual and professional twin brothers. Twenty men working in silence in a library grow in respect for each other, in ethical feeling, in professional brotherhood.

Even the smallest library in a county seat has a similar effect. Indeed, a book is a society, even in a poor doctor's office; often the society of a peer, frequently of a superior man. A dozen good books is a companionship of twelve. Those who live alone and practice alone in the country know that better than we appreciate it. They meet

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Reprinted from The Journal of the American Dental Association, October, 1923.

their colleagues rarely, their country societies meet once in two, or three or six months or not at all. But in a book they may carry a friend on the saddlebag, in the buggy; and in the smallest library of a country society they have as many friends as they can take home with them and give hospitality to."

The dental library furnishes the most complete if not the only possible record of the experience of the dental profession and must be the future potent factor in dental science, culture and education.

"A large medical library, besides being the proof of existing culture and of accumulated intellectual labor, fulfills its destiny by giving information. Here the medical man with scanty means will find his textbooks and monographs to aid him in unraveling the difficulties of a case on hand. He who has an ample library of his own, will consult rare books, old journals, expensive works. Here a vast number of journals may be consulted from day to day; here those who are engaged in literary pursuits find their historical records. Moreover, and that is a point upon which I cannot insist too much, a library causes the inculcation in a great many of the habit of study and research. Here, as always, opportunity creates demand. In that result the public is as much interested as is the profession. The safety of the public requires cultured and erudite physicians. Both the ethical and the intellectual standard of both parties will stand or grow or fall together."—A. Jacobi.

The dental library is a school, a very important school, where one may commune with all the old dental and medical writers for the asking.

The dental library should be the repository of all the papers and books, and other items relating to the dental history of the community which it serves. The best time to collect such items is while they are new and before they have become objects of great rarity. The collection should include all the publications by dental men in the community whether on dental topics or not.

The library is not only a place where are gathered the best work of the masters of the times that are gone but it holds equally well the best thought of the present age. In the new books, and particularly in the monographs and journals, one finds an everchanging store of information. What the best men are doing the world over for all the different diseases and conditions. "Woe unto the man who fails in his duty of keeping up with the times! Only too often are his sins of omission descendent upon his own, as in the case related by Sir William Osler of the Physician who brought his cretin son for diagnosis. For years the misshapen, grotesque dwarf had sat directly under his father's eyes, and for years the journals and later books had featured the results obtained by the use of desiccated thyroid and had pictured the cretin with its unmistakable appearance. Both passed unnoticed, and the father answered that he was too busy practicing medicine to read books about it." The lesson is obvious. Unless one takes advantage of the best modern thought much is missed.

We can gather together this vast amount of loose material and endeavor to fill in our files until they are complete and no matter how large the library might be and the resources back of it, it will be impossible for any one institution to have an absolute perfect file of each and every dental publication so far published. This is easily proven if one should scan the want list of those libraries now in existence; nevertheless this should not deter an institution from endeavoring to constantly improve or prevent new ones from building a library.

We can, and should give the profession the opportunity to use the splendid collection of books at their disposal. We cannot drive them to drink and drink deeply of it, but those of us who have labored in the interest of the Library and of dental libraries in general, at least have the great satisfaction of knowing that we have paved the way for the profession, and see in the future an encouraging sign of an awakening.

In the hope of emphasizing the special care that this branch of literature should receive, and advance its proper library treatment, I have gathered together for your consideration a few suggestions.

Today we have so far established five types of dental libraries arranged in accordance to my idea of value and importance to the profession.

1. Dental Libraries an integral part of a large medical library, such as the Surgeon-General's Library in Washington; the one I have the honor of being connected with, the New York Academy of Medicine; and the Denver Dental Association's Library.
2. Libraries in Universities or Colleges, such as the Northwestern Dental, Chicago, the University of Pennsylvania, Philadelphia, the University of Michigan, Ann Arbor and many others.
3. Libraries belonging to Dental Societies, such as the Eighth District Dental Society, Buffalo, New York.
4. Libraries connected with Public Libraries, i. e., Cleveland.
5. Private libraries.

As dentistry today is considered a specialized part of medicine I desire to call to your attention the advisability of having the dental section a part of the medical library. This I know will not find favor with a majority of dental librarians, and only because they are not conversant with the conditions.

The Library supported by the First District Dental Society, State of New York, is a part and parcel of the Library of the New York Academy of Medicine. The members of the above Society have access to over 120,000 medical books (not including duplicates) 77,000 pamphlets, and 12,000 reprints and are permitted to borrow all duplicates, and all but the last editions of such medical works as they desire, except purely reference works. The above material is carefully indexed and cross indexed. Over 34,000 cards have been used for the card catalogue. Only those who have made use of this index can realize what this means.

A. L. Northrup provided wisely, when upon careful consideration and due deliberation he presented his wonderful dental library to the Academy and not the local societies. He thus assured himself that it would be permanently located, and not in some years to come be broken up, sold or destroyed, and at the same time, that in the future it would be properly supervised and looked after. Only in large permanent institution, with ample help can this be done, and the full benefit to the profession and members thereof be derived.

The question of the value and the need of a dental library to any community and especially to the local societies, I hardly believe needs to be discussed here. In large cities where the profession is well organized the problem is at present a fairly simple one and is being well worked out in such cities as New York, Chicago, Philadelphia, Boston, San Francisco and Denver.

In smaller cities the problem is more difficult and yet if given time and the proper support, there is no reason why each local or state society cannot have a fairly good working library.

Dental Libraries usually grow from some private collection donated *en bloc* to start with, or by slow accretion, the nucleus being some small group of books belonging to a dental society, study club or a number of individuals.

The dental section of the New York Academy of Medicine had its origin through the gift of A. L. Northrup's library; Washington University, St. Louis, the McKellop's library and part of Herman Prinz's the Eighth District, Buffalo, New York, the Whitney and T. G. Lewis Libraries and the Thos. W. Evans Institute, University of Pennsylvania, the E. C. Kirk and part of Herman Prinz's libraries; University of Pittsburg, the Alfred Lee Library.

Establishing a library: There must first of all be some organization to start the work of securing and housing the dental library. Even without a permanent abiding place, a beginning should be made at collecting a library and the accumulation of books and journals will make necessary a place for keeping these. Every well-organized dental society should have its own place of meeting, even though rented quarters and the library can then be best managed by them. This also applies to the colleges.

Material can be obtained from the duplicate copies of the larger libraries. The collecting of dental journals is a slow process unless one has the means to buy series after series of periodicals collected and bound. Each Institution obtains a surplus of local material, and it is by this slow and patient process, here a few and there a few that the library begins to grow. Such a method in the course of time brings together many duplicate copies, as has been all of our experiences. It is evident that the duplicates accumulated by a library in New York would be very different from those in Chicago or San Francisco. As each collection gets a surplus of local material, the process of exchanging with other libraries in other cities comes about naturally as the easiest way to complete the files. To facilitate this work this Society should undertake to save great waste of periodical literature and utilize it by manner of an established exchange.

There are two lines along which it will be necessary for this Association to proceed in order to improve the efficiency of collections in dental periodicals, namely:

(1) The introduction of systematic, comprehensive gathering and exchanges; and

(2) A general bettering of the methods of collecting.

Systematic gathering and exchanges are functions of the men in charge of dental libraries, and can be brought to a proper degree of efficiency by an association and collaboration of these. The association we now have, the collaboration we need.

A general bettering of the methods of collecting requires, in the first place, a good, handy, and general available manual of advice and instruction to those collectors who cannot be reached and taught personally.

A method that has been successful and has brought results well worth is the use of a postal and return postal such as is here shown.

First District Dental Society
State of New York

CLEAN UP

Do not throw Dental Journals or Reprints away at any time, they are of value to our Library. Please bear this in mind.

Before taking your vacation, clear your office of all unnecessary dental journals, reprints and books.

We desire all *Periodicals,* (odd numbers as well as complete volumes), *Dental Books,* no matter how old, *Pamphlets, Reprints* and any *Instrument* of scientific interest, such as old appliances, engines, drill, etc. We *earnestly request same.*

Undoubtedly you have some material which we are especially desirous of securing, and although they may be duplicates, these will assist us in exchanging with other libraries and to fill in those volumes that we do not have complete in our possession.

Back copies of the early numbers of the Dental Outlook and Scrap Book. Also the Progressive Dentist, Acorn, Odontologist, Penn Dental Journal, Stomatologist, Spectator, Ash's Monthly, etc., and Transactions of New York State Dental Society are desired.

By notifying the Librarian, he will be glad to have same called for and will acknowledge receipt.

Fraternally yours,
B. W. Weinberger,
Librarian and Curator,
40 East 41st St., N. Y. City.

I have
I will have } journals for the Dental Library.
I do not have

I have instruments for the Museum.

Please have an expressman call for my contributions.

Kindly phone in regard to Journals, etc.

Phone number ....

Date to be called for ....

Name ....

Address ....

This card is sent to both active and associate members, and upon receipt of the material another card acknowledging the gift is sent, expressing the thanks of the Society for same. Last year over 125 out of a total of 900 members returned the card and we thus received 315 books and 8573 journals.

To keep up the interest in the library upon each month's bulletin, a notice is inserted asking for donations and at the same time the recent additions to the library is published.

First Steps Upon Establishing a Library

Accessioning, carding and classifying.

The first step as soon as a book is received at the library, is to properly stamp and number same upon the title-page. It is then entered into a standard accession book, as shown in the following illustrations. Accession number, class, books, volumes, author, title, place and publisher, date, pages, source (if a gift the name of the contributor, or if purchased the fund under which is was procured), cost and remarks (Fig. 1).

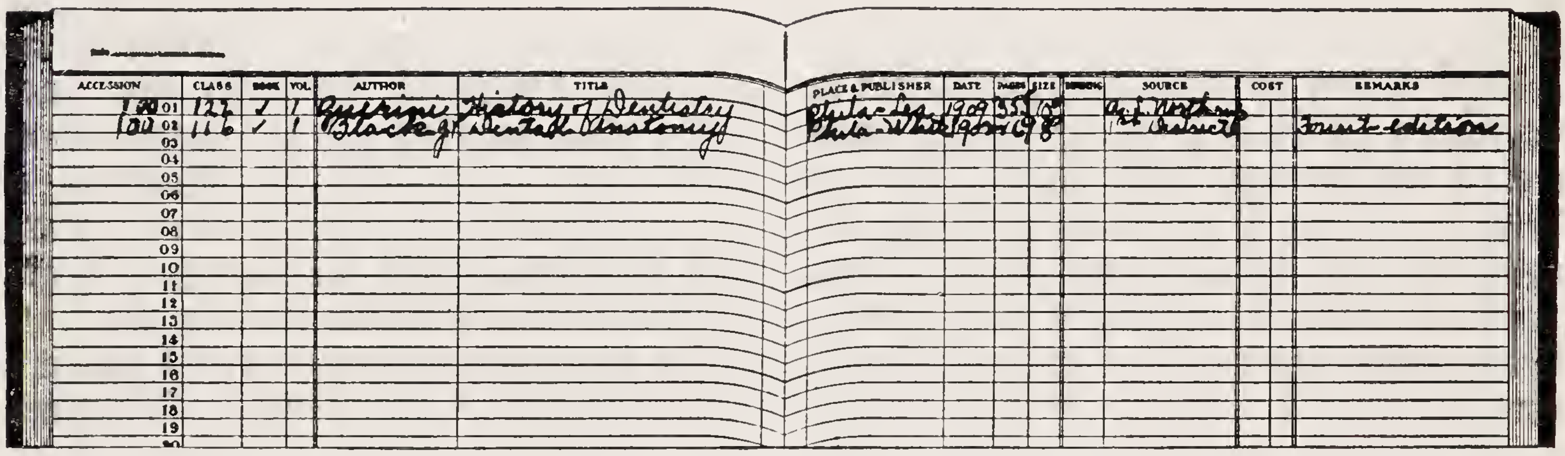


Fig. 1

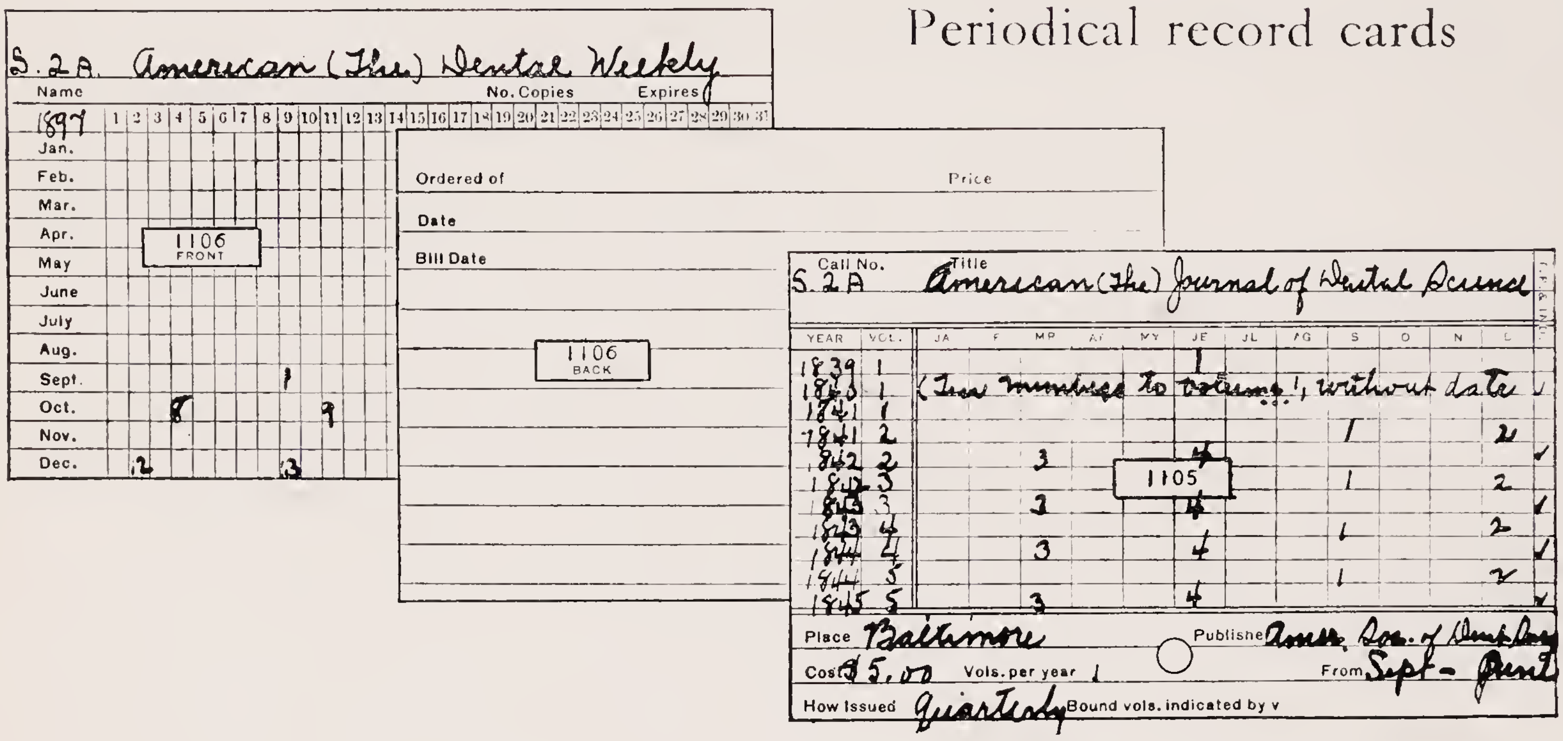
A ticket is then pasted on the inside cover, usually a special book plate for each fund with the proper location, (section) of book in the Library. Two cards are then typed, as follows:

1. *An author card,* giving author's full name, title-page in full, pagination, size, place of publication, publisher and date. On the back of this card is written in pencil the various cross-indices as to subject. If it is a pamphlet, the number. All pamphlets are filed in boxes according to the author's name, alphabetically. The author's card is thus the final authority as to the location. These cards as well as subject cards are arranged in strict alphabetical order.

2. *Subject card,* giving author's name with initials, title, size, place and date of publication, and location in upper left-hand corner. Over the top of

each card is placed a subject classification, i. e. "Dentistry (Periodical, Operative, etc.)."

3. *Periodical card.* With periodicals the procedure is somewhat different and is shown in the following illustration (Fig. 2). The cards used are those of the Library Bureau No. 1105 for monthly and No. 1106 for daily or weekly. When an issue of a periodical is received a check is properly placed upon a card of the specific journal. By referring to same at any time one can immediately tell if the number has been received, and what numbers are missing. These cards are used for maintaining a convenient and accurate record of the receipt, name, publisher, price and other particulars regarding each periodical received by the library.



Periodical record cards

S.2A. American (The) Dental Weekly
Name No. Copies Expires

1897	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Jan.																															
Feb.																															
Mar.																															
Apr.																															
May																															
June																															
July																															
Aug.																															
Sept.									1																						
Oct.				8							9																				
Nov.																															
Dec.		12							13																						

1106
FRONT

Ordered of Price
Date
Bill Date

1106
BACK

Call No. S.2A Title American (The) Journal of Dental Science

YEAR	VOL.	JA	F	MR	AP	MY	JE	JL	AG	S	O	N	D	T.P. & IND.
1839	1						1							
1840	1	(Two numbers to volume 1, without date												✓
1841	1													
1841	2									1			2	
1842	2			3			4							✓
1842	3									1			2	
1843	3			3			4							✓
1843	4									1			2	
1844	4			3			4							✓
1844	5									1			2	
1845	5			3			4							✓

1105

Place Baltimore Publisher Amer. Soc. of Dent. Surg.
Cost $5.00 Vols. per year 1 From Sept.–June
How issued Quarterly Bound vols. indicated by v

4. *Order cards,* for recording necessary data regarding books ordered for library use, also used as a blank on which the members may recommend new books to the library.

5. *Binding books.* Some means should be adopted for recording all books sent to the bindery, thus having a constant record of books and periodicals that are out for the above purpose.

Accessioning and shelf-listing are the means used to keep track of the books in the library, while cataloguing and classifying serve to make the material available to the public. It is usually consulted for the source and cost of items and for identification of multiple copies of the same work. The accession record can be used in a modified form, lots being entered as a whole and given a collective number instead of individual accession numbers for each work, thus serving all the purposes of the library and being economical of time and labor. A means of identification is afforded and the source is given. The cost is transferred to the order book under the collective number and duplication of records are minimized. The present cost is also generally entered in the book by the order department. This may seem a small matter but if you give these small matters your attention and consolidate and simplify your methods, so far as is possible with good work you will soon notice a decrease in your costs.

The shelf-list is one of the essential records of any well-ordered collection and the best modern practice is to use cards for this record. A card shelf-list is elastic and easily brought to date without destruction of previous work, while in the book form the sheets have to be rewritten constantly. A card list is economical of time, labor and material and it is indispensable in taking an inventory. As a matter of fact, it is the official stock-book of the library. It should give the history of any particular volume from the time it enters the library until its final disposition. Aside from its principal use, from it the librarian can get an idea of the contents of the collection by classes, thus determining the relative growth of subjects. It can be used by the cataloguers as a partial subject catalogue, but not a complete one, as it makes no provision for analytical or collective entries, each item being represented by a single entry.

Cataloguing: A satisfactory catalogue should clearly show all the resources of the library on any given subject as well as all the available works of any author. It will also indicate by the class number where a work may be found. Do not paste these numbers on the backs of the volumes.

Expert cataloguers differ as to minor details, and for this reason and to save the time constantly wasted in the discussion and consideration of minor points, every library should have its own set of catalogue rules to which it should adhere. You may have good cataloguing without a definite set of rules but it is an individual matter and your work is liable to become non-uniform and inconsistent. Rules carried in the head are not by any means the same as a definite set on paper.

Remember that your catalogue should aim at the greatest convenience to the greatest number. Try and put yourself in the place of the reader and see his point of view, which will help you in your work. The small as well as the large library has need for a full analytical catalogue of its resources. Each work should be searched for its hidden subjects, which very often do not appear in the title. Have a uniform series of subject headings. Make as many subjects as you like, but do not place subject cards in your catalogue until you have something on the subject.

Use sufficient references, both "cross" and "see," to make your catalogue usable. Be careful not to overload; readers dislike "see" and "see also" card. Do not cross-refer and leave your subject hanging in space. Have something to refer to when you use the cross-reference. Adopt a definite style of card in order to secure uniformity.

If possible in the large library an official catalogue of authors should be kept for the library staff. Such a catalogue is a great convenience, facilitates the work, saves times and labor.

For simplicity there is nothing better than the alphabetical (author) arrangement. Anyone can then immediately place his hand on the desired volume and not need to look for subject classification. The card index should take care of that arrangement, and this emphasizes the value of a good cross-reference subject catalogue.

Classification: Among the problems which confront the librarian called upon to organize or reorganize a library the twin problem of catalogue and classification is one of the foremost. In order that wisdom may be readily accessible to the searchers for knowledge and that the treasures of the library may not remain hidden, it should not only possess a good alphabetical catalogue, but should be well arranged in methodical order. Classification is an economy. Having before him the material belonging to allied classes and connected subjects in logical sequence his mind is constantly refreshed and kept in touch with the sources of information, his service becomes more and more efficient. And last, but not least, he is made aware of the deficiencies as well as of the resources and growth of his library in a most impressive way.

In attempting the solution of the question, "What classification is best?" for a given library the librarian may not always have before him in convenient form the data which he desires to assist him in arriving at the right conclusion. The literature of the subject has grown to vast proportions, and much of it is not readily accessible even in library centers.

Two courses are open to the librarian in determining what shall be the classification of his library: 1. He may decide to work out an individual system, especially adapted to the scope and character of the collections in his charge and their use. The procedure has been largely followed in the past, and is still preferred in many instances by the larger universities and reference libraries, libraries of other learned institutions and societies, and particularly those devoted to special sciences and research or to professional interests.

The alternative course then of adopting or adapting an existing scheme of classification will commend itself to him for its superior practical advantages. Such a classified subject index for dentistry is made in the plan of the Dewey Decimal Classification, as revised by Arthur D. Black and used throughout the new "Index of the Periodical Dental Literature," also "Manuel pour la classification decimal, etc.," Emil Huet, Bruxelles, 1920.

ARRANGEMENT OF BOOKS IN THE LIBRARY

The arrangement of books in the New York Academy of Medicine is a fairly complicated one and one which I shall not dwell at great length. As the dental section is a part of the medical library, Dr. Black's arrangement could not be utilized. The books are placed under sections on dentistry, jaws, teeth and mouth (in all cases placed strictly alphabetically) with the histories under the general section on histories. By referring to the card catalogue any book can be obtained within a few minutes.

The International Congresses are placed as such, while the societies in the United States are shelved together, alphabetically by title, the national societies in one class, the state societies in another, and those of local or smaller localities in another.

Transactions of other nationalities are shelved by title with the periodicals of that language.

For periodicals in general the arrangement is to divide them into classes of languages, the British in one section, the French in another, and so on, with the German, Italian, Spanish and Japanese, etc., each in a class by themselves.

We maintain a closed stock, but in the main reading room, on open shelves are portions of sets of periodicals that are constantly in demand, reference books and the important new accessions.

A characteristic feature of a dental library is the presence of a large collection of reprints, pamphlets, society and college announcements. I have endeavored to make this an important adjunct to our library. The reprint is the only means of ethical advertisement the dentist possesses and lately has been greatly abused. Few dentists send these to the library, except upon special request, but there are a few who save all that comes into their possession and forward them to us. We are therefore accumulating a valuable addition to our library.

I would like to see this Association go on record and request that all publishers of dental journals, when they print an edition of a reprint for the author, should at the same time strike off fifty more and send these to the libraries.

The cost would be but very little and would be of great help in building up the libraries.

Reprints are of value in a library for several reasons. This is best expressed by Mr. Frank Place, Jr., in the April 1921 Bulletin of the Medical Library Association.

"The first is that for purposes of circulation, a handful of reprints takes the place of a dozen ponderous tomes, a process pleasing to the man borrowing them, and to the librarian, in that the library's reference value is no whit impaired. In another way the reprint increases this reference value, through acting as an index to the bound journals. Our usage at the Academy shows this. We catalogue our reprints as we do books, so that the catalogue is an index to a considerable percentage of magazine articles.

"Our experience has shown us that a doctor's memory or bibliographic habits are no better than other people's. He is coming to us to find out when he wrote such and such an article as he has given away all his reprints. Or he reads Smith's article, but doesn't know when or where it was printed, or just what it was about. If we have the reprint our catalogue shows it to him. If not, we may have a half day's search before us.

"A fourth purpose which the reprint fulfills is in giving the complete article. Space in a magazine is sometimes so precious that the details of a case or the list of references must be omitted. These portions are restored in the reprint, an addition that correspondingly increases the value of the reprint, giving it a greater value than it had in the journal.

"Our method of taking care of pamphlets is to file them alphabetically by authors in a verticle file. A case of thirty-six boxes holds seven to nine thousand pamphlets at a cost of about a cent a pamphlet. The catalogue shows what we have."

Bibliographies, Histories

A dental library should have as many bibliographies as possible, as they are of great service as time savers when looking up a given subject. It is most advisable to have the sixteen volumes of the first series 1880-1895, and twenty-one volumes of the second series, 1896-1916, as well as the two volumes of the third series of the Index Catalogue of the Library of the Surgeon General's Office. An idea of this work and its value can be obtained from the following figures of the first two series. Under the author titles there are indexed 346,176 titles; 171,911 volumes and 317,795 medical and dental pamphlets. The subject titles show 304,962 book titles and 1,156,699 journal articles. While on its face this catalogue is only a library catalogue it is in effect an index of medical and dental literature of the world. This catalogue is also used as a code for subject headings and authors' names.

If a full set, is not available or impossible to obtain, the ten volumes under number 93 in the bibliography should certainly be included in every dental library.

There is also the Index Medicus, first a monthly, now a bi-monthly index of current medical literature, published in Washington under the able editorship of Fielding H. Garrison. This index contains most of the current literature in medical as well as a few of the dental journals.

In 1916 the American Medical Association began to issue a quarterly Cumulative Index which supplements the Index Medicus. This takes the place of the Index of the *Journal of the American Medical Association* issued previous to the above date and brought out twice a year.

We are fortunate in having some very good dental bibliographies, the most important are Coles 1883 No. 48, Dexter

1883 No. 49, Crowley 1885 No. 52, Taft 1886 No. 53, David 1889 No. 58, Lamb 1889 No. 59, Sternfeld 1891 No. 62. The latter is the most complete of all. Ports 1903-1916 No. 66, and Greve 1918 No. 82, Black's 1921, No. 85, 88, 89 and 90.

For those who are interested in building up the libraries the following sections on bibliographies and histories will prove of the greatest value, as only a few of the dental libraries can now obtain all of the above named works.

Note: Most of the following list was prepared and presented at the Milwaukee meeting before Weber's excellent article in the 1916-20 volume of the Index of the Periodical Literature appeared. However, in order to bring this up-to-date and as perfect as possible, Dr. King kindly returned the list for corrections and additions. I am indebted to Dr. Weber for some additions as well as all the bibliographies herein listed for material in compiling these lists. The section on Journal Articles as far as historical material is concerned contains only those important articles treating the subject of the "History of Dentistry" and not individual articles. I have in my library six bound volumes of nearly 4500 pages of the latter material.

The (*) under "Bibliotheca Stomatologica" indicates strictly dental works. Under history, books and articles devoted entirely to "History" (N) indicates they are to be found in the dental section of the New York Academy of Medicine and (W) in my own private library.

BIBLIOTHECA STOMATOLOGICA

1. 1695.—LeClerc D. and Mangetus J. J.: Bibliotheca Anatomica. Geneva, second edition, 1699. (N).

2. 1746—Bunon, Robert: Remarques sur deux traités nouveaux qui concernent les dents et éloge de leur auteur. Cologne, 20 p. (W).

3. 1776—Haller, A: Bibliotheca medicinae practical. Vol. I, (1776); Vol. II, (1777); Vol. III, (1779); Vol. IV, (1788). (N).

4. 1791—Baldinger, Hrsg Von Ernstus Godofredus—Neues Magazin vor Aerzte. Vols. I-XX, Leipzig, (1779-1798). (N). In Vol. XII are those especially treating on dentistry.

5. 1793—Ploucquet, Guilielmus Godofredus: Bibliotheca medico-practica et chirurgica, 1793-1797. Vol. II, 1794, p. 682-714. (N).

6. 1799—Ploucquet Guilielmus Godofredus: 1799-1803. Vol. I, 1799; p. 311-312. (N).

7. 1803—Ploucquet Guilielmus Godofredus: p. 248-256. (N).

8. 1813—Ploucquet Guilielmus Godofredus: 1808-1813. Two volumes p. 387-388. (N).

9. 1810—Laforgue L.: Théorie et pratique de l'art du dentiste. Two volumes Paris, 337 p., I 334 p., II 377 p. Chapter XXXVII, p. 173-358. Contain 76 works of authors treating with dentistry, arranged alphabetically with a review of each work. Pages 359-364 a list of 157 authors is cited in this work, the volume and page, whether they were "dentiste, chirurgien or medecin." The first attempt at a review and a serious compilation of dental material. (N).

10. 1814—Murat: Dictionaire des Sciences Médicales. (N). (Dictionnaire has but one N in this edition.) 1806-1818, Vol. VIII on p. 423 are found 24 references to works referred to in article "Dents."

11. 1828—Maury, J. C. F.: Traité complet de l'art du dentiste, d'aprés l'etat actuel des connaissances. Avec atlas de 40 pl. 520 pages (Paris), Gabou. (N). The original edition was issued twice, one with colored plates and the other without. Maury was among the first to make a serious attempt to compile a strictly dental bibliography, and although it contains many errors there are recorded 332 books and 249 authors. Arranged alphabetically. First German edition, I volume, Weiman, 1830, 368 pages. Second edition, Paris Rouvier, 578 p. Bibl. p. 519-542. (N. W.). Second German edition, Weiman, 1840, 392 p. Bibl. p. 367-382. Third edition, Paris, 1841, II volumes, 472 p. One atlas and 42 plates. The bibliography on p. 447-464 was compiled by Paul Gresset, but does not differ from the second. (N-W). American edition translated by J. B. Savier, Philadelphia, Lea, 324 p. Bibliography p. 267-283 with an apended list by Savier. Pages 283-285 of 38 additional works. (N-W).

12. 1829—Fitch, Samuel S.: A System of Dental Surgery, 568 p. New York (N-W). Contains in pages 561-568 a list of authors and books almost a duplicate of Maury's, but not as well arranged. For some reason he translated the titles of the works into English instead of leaving them in the original. Second edition, 1835, 551 p.

13. 1830-1844—Carabelli, George: Systematische Handbuch der Zahnheilkunde, Wien.

The literature as found in the 1844 edition, history of dentistry. Vol. I. (N).

14. 1831—Begin, J. L.: Dictionnaire de médecine et de chirurgie, Paris, 1829-36. (N). In volume six, 1831 article "Dents" p. 161-219, bibliography p. 217-219.

15. 1831—Duges, A.: Dictionnaire de medecine et de chirurgie, Article "Dentition." (N).

16. 1833—Maury, (J. C. F.) and Gresset, P.: Traité complete de l'are du dentiste, etc. Second edition. Paris, p. 519-542. (N-W).

17. 1835—Fitch, S. S.: A System of Dental Surgery. Second edition. (N). In this edition the titles are in the original language.

18. 1835—Oudet, J. E.: Dictionnaire de médecine. (N). Second series, Vol. X, article "Dents" and "Odontologia." "Odontotechnic" (meme Dict., 21, 1840) 102 p. A very good and complete list of authors, books and papers are therein recorded.

19. 1837—Linderer, C. J. and J.: Handbuch der Zahnheilkunde, enthaltend Anatomie und Physiologie, Berlin, 1837. (W). Mit 18 lith. Tafeln VIII, 502 p.

20. 1842—Linderer, J.: Handbuch der Zahnheilkunde, etc., Berlin. Second edition, (N). Two volumes, 502 and 491 p. Authors p. 492-493. Contains only 25 references at the end to the works consulted in writing his book. The same number is found in the 1837 edition. 1842-1848.

21. 1843—Desirabode, M.: Nouveaux éléments complets de la science et de l'art du dentiste, (W). Two volumes, Paris, 839 p. September 1843 most of the bibliographies state that this was published in two volumes, my copy with two parts bound in the original is in one. Contains a history and bibliography p. 787-839. The bibliography is arranged chronologically and contains the more important works, 460 being recorded up to 1844. Second edition, 1845, two volumes, 839 p: The same, Baltimore first edition. Translated from the second French edition for the American Library of Dental Science by Chapin A. Harris. Also issued in serial form in American Journal and Library of Dental Science, Vol. VII and VIII. Neither the book's nor the journal's article contains the historical or bibliographical chapter. The edition referred to in David p. 87, Sternfeld p. 48, taken from Crowley p. 123 in 1886 and dated 1847, Philadelphia, is undoubtedly the translation by Robert Arthur in the American Journal of Dental Science, second series, Vol. VII, Number 1, Jan. p. 32-60, Phila. 1857. This is also the article referred to in the Dental Register, Vol. XXXIX, 1885, p. 637. Arranged chronologically.

22. 1843—Maury, (J. C.) F.: Treatise on the dental art founded on actual experiences, translated by J. B. Savier, Phila., 324 p. (N-W). Bibliography p. 267-285, appended list of 38 works, p. 283-285.

23. 1844—Carabelli, Geo.: Systematisches Handbuch der Zahnheilkunde. Two volumes. Vol. I, 176 p. Vol. II, 244 p. (N). Vol. I is the History of Dentistry with foot notes as to work cited. On p. 158-176 is the literature of dentistry, from Ryff 1548 chronologically to Liszai 1830, 333 references. A very good guide to dental literature but contains many errors.

24. 1844—Goddard, Paul B.: The Anatomy, Physiology and Pathology of the Human Teeth. Phila. 277 p. 4° (N-W). The bibliography on p. 180-192 is an exact copy of Maury's.

25. 1845—Desirabodé: Nouveaux éléments complets de la science et de l'art du dentiste. Second edition, Paris, 839 p.

26. 1847—Desirabode, Malagou (Ed.): Complete Elements of the Science and Art of the Dentist. (N-W). First American edition from the second French edition Baltimore, American Society of Dental Surgeons, 552 p. Translated by Chapin A. Harris, only foot notes, see 1857.

27. 1846—Rogers, Wm.: Dictionnaire des sciences dentaires, suivi d'un dictionnaire de bibliographie dentaire. Paris 294 p. Second edition, 1847, 639 p. (W).

28. 1848—Lindered, Jos.: Handbuch der Zahnheilkunde, etc. Second edition Berlin. (N). Bibliography p. 454-484. From 1545-1847.

29. 1849—Engleman, Wm.: Bibliotheca Medico-Chirurgica et Anatomica. Physiologica 1750-1847. (N). Supplement 1848-1867. Contains numerous works relating to dentistry.

30. 1849—*Harris, Chapin A.: Dictionary of Dental Science, Biography, Bibliography and Medical Terminology, Philadelphia, p. 778. (N-W). Second edition 1855, third edition 1867, fourth edition 1882, fifth edition 1891, sixth edition 1898. (N). This work as the title indicates is very exhaustive, thorough and is unique in the way of dental books.

31. 1849—Ruprecht, Carl: Bibliotheca Medico-Chirurgica, etc. Leipzig 1847-1892, 46 years. (N). Issued quarterly as a catalogue of new books and has a section relating to dentistry.

32. 1851—*Arthur, Robert: Report on Dental Literature, American Journal of Dental Science, second series, Vol. II, October, 1851. p. 43-59. (N-W). A report on dental literature published in America of 35 books and 11 works as published in American Journal and Library of Dental Science. Also five jour-

nals. Arranged chronologically with a detailed review of each work.

33. 1851—Linderer, Jos.: Die Zahnheilkunde nach ihrem neusten Standpunkte. Erlangen, 484 p. Titles of books p. 439-481. (N-W). The history Part V, p. 343-438 mentions a long list of authors and their works, according to countries. Pages 438-480 contain a chronological list from Herodotus 484 B. C. to 1850 A. D. A very exhaustive work, fairly accurate, thorough and well worth having.

34. 1857—*Desirabode, M.: Historical and Chronological Sketches of the most important works in the Dental Art, etc. American Journal of Dental Science, second series, Vol. VII, No. 1, January, p. 32-60. (N-W).

35. 1865—*Catalogues of a large private library of the late Chapin A. Harris, N. Y. 44 p. (N).

36. 1867—*Büchting, Adolph: Bibliotheca Odontiatrica, 1847-1866, Nordhausen 14 p. (N).

37. 1869—Sarazen, Charles: Nouveau Dictionnaire de Medicine et de Chirurgie, 1864-1886, Vol. XI, p. 182-183. (N).

38. 1869—Faure, V. P.: Aves de l' editeur l''Encyclopédia universelle des sciences et arts dentaire au XIXe siecle. Bruxelles 21 p. 4°.

39. 1874—Pauly, A.: Bibliographic des Sciences Medicals, Paris (N). A few references are to be found of the older works.

40. 1876—*Dexter, James E.: History of Dental and Oral Science in America, Philadelphia, p. 215-229, Dental literature, standard works, p. 229-235 periodicals, (N-W). This work presenting 70 works in chronological order of the standard literature of American dentistry from Woofendale 1783 to Spooner 1836 and a list of 29 dental journals.

41. 1877—Hinrich's Hallbjahrs: Katalogue Bücher, Zeitschrift Landkarten,. (N). A book sellers catalogue of medical works published during the year, contains section on dentistry. 95 volumes from 1877 to 1921 current.

42. 1878—Lempertz: Bibliotheca Medica, Bohn. **(N).**

43. 1879—*Catalogue of the Library of the Odontological Society of Great Britain, London, 24 p. Second edition 1905. (W). This was the first effort made to publish a catalogue of a dental library. Arranged alphabetically crossed references to books and authors. From the numbers this library must have had over 500 dental and medical works, including books, periodicals, transactions, etc. Appendix issued in June, 1882, 9 p., 164 references.

44. 1879—Index Medicus 1879. Current, monthly index until 1921 and then bi-monthly. Washington. (N). A very important addition to any library.

45. 1880-1895, 1896-1918—Index catalogue of the Surgeon General's Office, Washington, first and second series, 4°. See end. (N).

46. 1882—*Coles, J. Oakley: An address on dental literature (N-W) read before the British Dental Association, August, 1882. 20 p. Published in the Journal of the British Dental Association, Vol. IV, 1883, p. 59-70, 118-127. Also British Journal of Dental Science, p. 203-213, 414-422. (N-W).

47. 1882—Magitot, E.: Dictionnaire Encyclopédique des Sciences Médicales, 1844-1889, Vol. XXVII, p. 137-140, Bibliography, p. 405-408, Article Dents, p. 1-405. (N).

48. 1883—*Coles, J. Oakley: A list of works on dentistry published 1538-1582 with a catalogue of the periodical literature relating to the profession, 1839-1882, London, 35 p. (W). This was an appendix to the above address. This work was the first of a series of dental bibliographies and was divided into 12 sections, as follows: German, Swedish, Dutch, and Danish, 16, 17, 18, 19 centuries beginning with 1536, Zene Artzney; French, Italian, Belgian, Spanish, and Swiss; English 17, 18, 19 century. America 18 and 19 century; Periodical literature, English, Colonial, German and Danish, French and Italian, Spanish, American. Papers published in the Proceedings of the International Medical Congress. London, 1881, Transactions of the Odontological Society of Great Britain, 1857-1882. An unusually interesting work. Chronological.

49. 1883—*Dexter, James E.: Index of Vol. I-XXIV, Dental Cosmos, 1859-1883, Philadelphia, 367 p. (N-W). A very complete index of the material published in the Dental Cosmos. Arranged according to authors and subject. As only a content index was published each year until 1889 this work is essential in using the first 24 volumes of the Cosmos.

50. 1884-1887—Caulk's Dental Annual-short lists (1884-1887). (N-W).

51. 1884—Hirsch, Aug.: Biographisches Lexikon der heworragden arzte alle zeiten und Völker. Wein-Leipzig, 4 vols. (N).

52. 1885—*Crowley, C. George: Dental Bibliography, etc. 1536-1885, Philadelphia. 2047 authors. (N-W). Published interleaved and without interleaves. Arranged similarly to Coles, chronologically but in five sections and does not include the periodical literature. Numbered, section 1, German devoted to Germany, Austria, Holland, Norway, Sweden, Denmark and Switzerland, p. 1-52, No. 1-752. Section II, French. France, Belgium and Switzerland, p. 53-97, No. 753-1462. Section 111, Spain and Italy, p. 98-100, No. 1463-1508. Section IV, English. Great Britain and Ireland, p. 101-117, No. 1509-1738. Section V, American, p. 117-138, No. 1739-2047. Author index p. 139-180. Alphabetically, re-

ferring however only to number. A more thorough, complete and accurate index than Coles.

53. 1886—*Tait, Jonathan: Index to the Periodical Literature of Science and Art, Philadelphia, 212 p. (N-W). An important addition, as this was the first attempt made to index all the periodical literature in the English language. First part devoted to bibliographies of dental periodicals, 1839-1888, p. 1-9, list of 115 dental journals published throughout the world, chronologically arranged. Part 2 subjects, p. 15-128. Part 3 authors index, p. 130-212. The subject and authors are given alphabetically. No pages referred to in the authors' index, only referring to the subject, rather confusing.

54. 1886—David, T.: Les originis francaise de le chirurgie dentaire. Coulommiers, Paris, p. 47. (W). Bibliography of 47 works of Davids' at end of work, p. 25 and 26.

55. 1886—Thomas L.: Association générale des dentiste de France. Bibliotheque, Paris, 90 p. Catalogue of the Library of the Dental School in Paris.

56. 1887—David Th. A, Fanton: Sa Vie, Son Temps, Son Oeuvre, (W). 55 p. Bibliography, p. 52-54.

57. 1888—Brasseur, E. J. N.: Encyclopédie internationale de chirurgie. Des dents et de leurs annexes. Paris, p. 555-654. (David).

58. 1889—*David, Th.: Bibliographie francaise de l'art dentaire, Paris, 307 P. 2981 references. (W). This work introduced a new step in bibliographical work, as it is confined to those published only in one language, namely French. First part. Journal and reviews, 21 in number, p. 1-5. The first is a medical journal published in March, 1818 and February, 1819, 1857-1887 chronological. Part 2, books and treatises p. 5-284, alphabetical. Supplement p. 284-289. Table of contents arranged according to a method of classification of dentistry devised by the author. Each class containing the name of the authors alphabetically arranged. There are seventy main classes with eighty-nine additional subdivisions.

59. 1889—*Lamb, J. Melvin: A monthly bibliography of dental literature, published in the Dental Cosmos, 1889-1903. (N-W). Published in 166 monthly numbers of the Dental Cosmos from March 1889 to December 1902. This work was compiled in the Library of the Surgeon General's Office, Washington, and consisted of an average of four pages each month. First giving a list of new books and journals that were received at the Library, and then alphabetically the author's name, title of paper and periodical in which it was published, page, volume and year. Most of this material was utilized for the sections issued later in the Index Catalogue of the Surgeon General's Office. As the work was not appreciated by the profession, the Dental Cosmos discontinued issuing same after fourteen years and upon its discontinuation only two inquiries were received as to the reason for stopping same. Have had these numbers bound in a single volume of 696 pages and find same not only a presentable addition to my library but a very useful reference work.

60. 1890—Brandt, Ludwig: Lehrbuch der Zahnheilkunde Berlin 708 p. (W). This work contains excellent lists of literature pertaining to various dental subjects treated in the above works. Pages 1 and 2, 25 references, 117 and 118, 75 references, 266, 27 references 378 and 379, 56 references, 526, 18 references, 578, 4 references, 640, 11 references, 55 and 56, 47 references, 199 and 200, 51 references, 285 and 286, 54 references, 437 and 439, 123 references, 560, 5 references, 603 and 604, 71 references, 680, 47 references, a total of 567 references.

61. 1891—Catching, B. H.: Catching's Compendium of Practical Dentistry, 1891-1896. 1891 Journals, p. 237-240; books, 240-241; 1892 Journals p. 277-281; books 281-282; 1893 Journals, p. 293-297; books 297-299; 1894 Journals p. 301-305; books, 305-307; 1895 Journals p. 312-316; books 317-319.

62. 1891—*Sternfeld, Alfred and Kellner, Karl: Zahnärtzliche Bücherkunde, Bibliographisches Verzeichniss, von Buchern, etc. Karlsruhe, 211 p. 4363 references. (N-W). Issued in six numbers and arranged alphabetically by authors and then chronologically as to material. The most useful, practical and accurate bibliography we have in dentistry. Not only books are indexed but also dissertations and articles from various periodicals with the name of the journals, year and page. This bibliography should be in every library and as it is almost impossible to obtain a copy, by buying the numbers in the following Journal a copy might be secured. It was also published in seven numbers of the Oesterreichisch-ungarische Vierteljahresschrift fur Zahnheilkunde, January, April, July, October 1891; January, April and July 1892. These are somewhat smaller in size than the sections of the books, but are to be found in the back of each number of the journal and numbered consecutively.

63. 1899—*Report on Committee on History. (N-W). Transactions of National Dental Association, p. 48-54.

64. *McKellops, H.: Contents of Dr. H. J. McKellop's dental library 189-, 38 p., 120, indexed according to subject and author, (N).

65. 1900—*Jahrlicher literarische Wegweiser, Prof. Arkövy, published in Oesterreichisch-ungarische Vierteljahresschrift fur Zahnheilkunde, January, 1896-1899, October, 1899-1900. (W).

65 a. 1901—*Bensow, S. C. Forteckning öfer, Nordisk Tandlärkare-litterature instill ar 1901. Helsingfors, 46 pp. (W). Pages 3 and 4 list of journals reviewed. Pages 5 to 44 authors' index, alphabetical. Pages 45 and 46 errors.

65 b. 1900—*Bonnard, E. Bibliothéque Catalogue. L'ecole et du dispensaire dentaires de Paris. Paris, 204 pp. (W). Page I list of Librarians from 1879-1900. Page II to IX, History. X, List of donators. Pages 1-102 alphabetical list of authors with works arranged chronologically. Pages 102-125 alphabetical list of subject material with authors' names. Pages 125-195, subject catalogue according to authors. 1st, Dentistry arranged according to classification. 2nd, Medicine. 3rd, Science. 4th, Miscellaneous. 5th, Periodical list.

66. 1903—*Port, G.: Index der deutschen Zahnärztlichen literature und Zahnärztliche bibliographie, Heidelberg. An index of the German literature from 1847 to 1902, 1418 p. 1904, 1 vol. for 1903, 180 p; 1905, 1 vol. for 1904, 184 p,; 1906, 1 vol. for 1905, 202 p.; 1907, 1 vol. for 1906 and 1907, 280 p.; 1908-1912, 1 vol.; 516 p., 1913, 1 vol.; 1914, 1 vol.; 1916, 1 vol. for 1914, 153 p. Port endeavored to index the complete dental literature and is the most accurate and exhaustive work of its kind. Unfortunately most of these are out of print and almost impossible to obtain. (W). This series was reprinted in 1922 by Meusser of Berlin and can now be procured in nine volumes. (W).

66a. 1905—Catalogue of the Library of the Odontological Society of Great Britain, London, 78 pp. Arranged alphabetically, authors and subjects together. (W).

67. 1904—*Eichler, Max: Index der deutschen und wichtigsten ausländischen Zahnärztlichen Literatur. Bohnn, 177 p. (W). As the name implies this is purely an index of periodical literature of 93 dental periodicals, similar to Taft's.

68. 1908—Pfaff, Ph.: Lehrbuch der Orthodontie. Dresden 484 p. (W). The "Literature of Orthodontia" p. 460-483. Pfaff lists 563 books, articles in journals, dissertations, etc., pertaining to the subject of Orthodontia. Arranged chronologically.

69. 1909—Koch's History of Dentistry, 3 volumes. (N-W). In Vol. I, Wm. H. Trueman compiled the article, Dental Journals of the United States, p. 321-355, while Edward C. Mills, A Historical Review of Dental Literature, p. 355-387.

70. 1909—*Black, Arthur D.: Classified Index of the Proceedings of the First District Dental Society, State of New York, 23 p. (W). The only record this Society has of its proceedings and although an index of a local Society, it is for the above reason that it becomes exceedingly useful.

71. 1909—*Weber, Andres G.: Bibliographia Dentalis. Fifth International Dental Congress, Vol. II, p. 676-682.

72. 1910—Bonnet, J. L. Andre: Historie generale de la chirurgie dentaire, Paris. (W). Bibliography p. 304-316.

72a. 1910—*Svensk Tandläkare Tidskrifts Fästband. Stockholm, 267 pp. (W).

73. 1911—*Martinez, Sänchez Jose. Indice para former un Catälogo razonado de las obras impresas en castellano que traten sobre et Arte del Dentista. Bibliografia de la Odontologia Españla. Madrid, 1911, 8° VIII, 63 p. Bibliography of Spanish Odontology (Weber).

74. 1911—*Terra, Paul De: Index Stomatologicus 1912, 1913, 1914. (W). Published in Ergebnisse der gesamten Zahnheilkunde, 1911-1912. Deutsche Zahnärtzliche Zeitung 1912-1913, Archives für Zahnheilkunde 1913 and 1914.

75. 1914—*Black, Arthur D.: Classified subject index and author index of the Proceedings of the Illinois State Dental Society for fifty years. 1865-1914, 268 p. (W).

76. 1914—*Gadd, Pehr.:Findlands Odontologiska Literatur, 1900-1913, Helsingfors, 1914, 37 p. (W). First part (A) a list of periodical literature of Findland. (B and C) Titles of foreign periodicals arranged alphabetically. Index of 1900 to 1913, each year separately and alphabetically. Ending with an author index. This was published as a supplement to number XIV, 1914. Suomen Hammaslääkärisewian Toimiuksia. Finska Tandläkaresällskapets Förhandlinger, Vol. II, issued in 1920.

77. 1914—*Legrand, A.: Bibliographie Dentaire Catalogue de Livre d' occasion. Paris 16 p. 549 references of french works, arranged by author alphabetically. (W).

78. 1914—*Weber, Andres G.: Bibliographia et Biblioicomographia Stomatologicae 1509-1914. Report in Transactions of Sixth International Dental Congress. London. (W)

79. 1916—Weinberger, Bernhard W.: Dental Bibliography in the Library of Academy of Medicine, N. Y. C. 40 p. (W). 729 books and 216 journals.

80. 1916—*Anthony, L. P.: Dental Publications in the World, Philadelphia. Received at the Dental Cosmos Office. The list records 108 periodicals published throughout the world, also another in 1918 showing only 85 journals were being exchanged.

81. 1916—Weinberger, Bernhard W.: A New Index of all Orthodontic Literature. (Private). 8400 references, authors and subjects.

82. 1918—*Greve, H. Chr.: Die Zahnärztlichen Literature vom ihren Beginn bis

zum Jahre 1845. Weisbaden. (W). Published in Ergebnisse der gesamten Zahnheilkunde. Vol. VI, p. 17-69. Arranged chronologically from 3700 B C. Papyris Ebers to 1845 S. Wolffsohn. One of the best lists compiled since Sternfeld's, more accurate with an added advantage that before each author's name there is a classification designating the subject as either therapeutics, pathology, chirurgy, hygiene, history, etc., thus answering a twofold purpose. Have had this bound and find it makes a most desirable bibliography.

83. 1918—*Lind, G. F. Duyvensz, en G. H. Bisseling: Lijst van werken over Tandheelkunde in Mederlandsche Bibliotheken. Gravenhagee, 48 p. (W). A catalogue of the dental material found in eight of the University Libraries in Holland. First part is an author index with a letter after each subject showing in just what library the work can be found. 493 works are listed. Second part, list of journals, 493-521. Then a table of each library with the number showing the works to be found in each. At the end a subject classification with the same method pursued.

84. 1919—*Bebb, William: Bibliography of Dental Journals published in the United States and Canada, published in the Journal of the National Dental Association, March 1919, also reprinted, 10 p. (W). A very comprehensive and accurate piece of work, although not a complete list. Doubt if such a thing will ever be accomplished by a single individual. It is so near perfect and reliable however that the few journals that are missing do not detract from the list.

85. 1920—*Huet, Emile: Manuel pour la Classification Décimale des écrits et Documents relatifs a la Stomatologie etä l'odontologie. (W). 308 p. A classification arranged on a decimal system, along the lines of Blacks, but much more comprehensive and detailed. First. Preface and subject matter, 220 p. Index alphabetical, p. 221-303, Table of material Index 304-306, Index 307-308. First published in Revue Dentaire Belge, serially, 1919-1920.

86. 1921—*Gadd, Pehr.: Findlands Odontologiska Litteratur 1914-1920. Aggelby 1921, 24 p. (W). Same arrangement as in 1914 volume.

87. 1921—*Black, Arthur D.: Classified Index of Dental Periodical Literature as published in the English language for five years. 1911-1915, 478 p. Published by the Dental Index Bureau, American Institute of Dental Teachers. An index of 65 American and English dental publications for the years 1911-1915. Arranged first according to subject based on the Dewey-Blacks Decimal System and the author index. It is not necessary to describe this or the following works. Anyone interested in dental literature will have to possess them sooner or later, for they are absolutely essential in any library, medical or dental.

88. 1921—*Weinberger, Bernhard W.: Eighteen Years of the American Society of Orthodontists, a Review with an Index of its Transactions. 40 p., N. Y.

89. 1921—*Weinberger, Bernhard W.: Orthodontic Bibliotheca, Dental Cosmos, November, 1921, p. 1126-1140. A list of works written exclusively for Orthodontia arranged alphabetically by author.

90. 1922—*Black, Arthur D.: Index of the Periodical Dental Literature for the year 1916-1920, 496 p. Third volume, 1839-75. To be issued in 1923.

91. 1922—*Black, Arthur D.: Index of the Periodical Dental Literature for the year 1921, 145 p.

92. 1922—*Weber, Andrés G.: Bibliographie Stomatological p. XIV-LIII of the Index of the Periodical Dental Literature, 1922. This is the most complete, accurate and reliable compilation of dental bibliographies heretofore published. For a description of his own bibliographies it is better to refer to the above article as justice could not be done in such a list as this.

93. Index Catalogue, Library of Surgeon General's Office. Classified according to subject. First series, Dentistry, Vol. III, p. 681-692, 1882; Jaws, Vol. VII, p. 189-230, 1886; Pyorrhea, Vol. X, p. 192-194, 1889; Mouth, Vol. IX, p. 492-503, 1888; Teeth, Vol. XIV, p. 241-267, 1893. Second series, Dentistry, Vol. IV, p. 129-152, 1899; Jaws, Vol. VIII, 428-456, 1903; Pyorrhea, Vol. XIV, p. 191-195, 1909; Mouth, Vol. XI, p. 134-159, 1906; Teeth, Vol. XVIII, p. 637-705, 1913. Total pages 259. Have been fortunate in obtaining the plate proofs of these sections and binding them into one book. (W).

94. Medical Periodicals and Transactions of Societies in the Library of the Surgeon General's Office, arranged alphabetically by countries. Vol. X, first series 1899, p. 723-936. Vol. XII, second series 1907, p. 839-978.

95. Alphabetical list of abbreviations of titles of Medical Periodicals (including dentistry) Library of Surgeon General's Office. Vol. I-XVI, 1895, 282 p. Vol. I-XXI 1916, second series, 233 p.

96. Text illustrating the History of Medicine in Library of Surgeon General's Office, arranged in chronological order. Vol. XVII, 1912, p. 89-178.

97. Besides the above there are a number of State Societies that have issued "Reports of Committee on Dental Science and Literature" and should be included in a general bibliography. Transactions of the American Dental Association. 1862, p. 69-76; 1863, p.

97-107; 1864, p. 43-54; 1866, p. 390-403; 1868, p. 113-221; 1871, p. 116-134; 1873, p. 164-176 and 177-83; 1875, p. 152-161; 1876, p. 177-193; 1877, p. 208-216; 1878, p. 185-198; 1879, p. 74-90; 1882, p. 131-139; 1883, p. 91-98; 1884, p. 143-149; 1887, p. 66-70; 1888, p. 230-236; 1889, p. 102-106; 1890, p. 50-58; 1891, p. 182-185; 1892, p. 119-121; 1893, p. 96-98; 1894, p. 54-55; 1897, p. 248-250; 1898, p. 88-90; 1899, p. 81-83.

98. Illinois State Society, Published in Dental Review: 1890, p. 856-864; 1891, p. 390-399; 1892, p. 552-556; 1893, p. 604-608; 1894, p. 421-426; 1895, p. 372-376; 1896, p. 392-395; 1897, p. 674-677; 1898, p. 441-444; 1899, p. 420-424; 1900, p. 539-543. Dental Digest: 1901, p. 551-557; 1902, p. 641-658; 1903, p. 1049-1059; 1905, p. 900-904. Dental Review: 1906, p. 682-685; 1907, p. 812-819; 1908, p. 557-572; 1909, p. 640-652; 1910, p. 655-665; 1911, p. 671-679; 1912, p. 704-725; 1913, p. 827-847; 1914, p. 876-879; 1915, p. 766-777; 1916, p. 704-721; 1917, p. 585-590; 1918, p. 679-696.

99. Pennsylvania State Dental Society, published in Dental Cosmos: 1910, p. 1376-1379; 1911, p. 1333-1337; 1912, p. 1138-1144; 1913, p. 90-95; 1919, p. 633-640; 1920, p. 742-751; 1921, p. 704-716.

TEXTS ILLUSTRATING DENTAL HISTORY

Most dental histories contain fairly accurate records of dental literature. The first section are those works pertaining entirely to dental history. Second section: Those works having introductory or chapters on dental history. Third section: Dissertations or small treatises on historical subjects relating to dentistry. Fourth section: Journal articles treating with the subject "History of Dentistry.

SECTION I

1. 1796—Arnemann, Justus: Ubersicht der berühmtesten und gebräuchlichsten chirurgischen Instrument älterer und neuerer zeit.. Göttingen.

2. 1906—Delabarre, C. F.: Diss sur l' historie des dents. Paris, 30 p. 4°. (W).

3. 1808—*Duval, Jacques René: Recherches historiques sur l' art du dentiste, chez les anciens. Paris, 24 p. (W).

4. 1821—*Audibran-Chambly (Joseph): Traité historique et pratique sur les dents artificielles incorrupibles, etc., Paris, 192 p. (W).

5. 1830—Chéreau, A.: Odontological, purely historical, p. 184-191. Vol. XIV, Dictionaire des Sciences Medicales, Paris. (N).

6. 1834—Duval, J. R.: Notice historico-medicale sur les Normands, Paris. (W).

7. 1844—*Carabelli: Systematische Handbuch der Zahnheilkunde, Vol. II, p. 1-158. (N). The first exhaustive history written on dentistry.

8. 1847—Audibran, J.: Fondation de la Société de chirurgie dentaire de Paris, etc. Paris, 154 p. (W).

9. 1848—*Linderer, Jos.: Handbuch der Zahnheilkunde, second edition. Berlin, History of Dentistry, part five, p. 402-454. (N).

10. 1851—*Linderer, Jos.: Die Zahnheilkunde nach ihren neusten Standpunkte, Erlangen, History, part five, p. 345-438. (W). An excellent history and review.

11. 1854—Hénoque, J. B. B.: Esculape et Thémis ou les dentistes au XIXe siecle, Paris, 64 p. (W).

12. 1857—*Desirabode, M.: Historical and Chronological Sketches of the Most Important Works on the Dental Art and the Special Principles serving as its Basis which have been published from the days of Hippocrates down to the present time—translated by Robert Arthur, American Journal of Dental Science, January 1857, p. 32-66. (N-W).

13. 1863—Central-Verein Deutscher Zahnärzte, Wein. (W).

14. 1867—Didsbury, Henry: Histoire anecdotique des dents, Paris, 57 p. (W).

15. 1867—Steinberger, Philipp, Uber die geschichtliche Entwicklung der Zahnheilkunde. Wien, 24 pp. (W).

15a. 1875—Preterre, Pierre, Apollonie l' art dentaire en Italie. Paris, 30 pp. (W).

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Aus dem Institut für Geschichte der Medizin an der Universität Leipzig. Direktor: Geheimrat Prof. Dr. Sudhoff.

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DEUTSCHE VOLKSMEDIZIN IN DER ,,MANESSE-HANDSCHRIFT".

(Pal. Germ. 848.)

Von

Dr. FRIEDRICH WEINDLER, München.

Diese kostbare und schicksalsreiche ,,*große Heidelberger Liederhandschrift*" ist mit ihrem erstaunlichen Reichtum an farbenprächtigen und frischen Bildthemen oberrheinischer Miniaturmalerei aus dem kulturvollen Gesamtbild des deutschen Volkes nicht mehr wegzudenken. Über zweiundeinhalb Jahrhunderte unserem Vaterlande entfremdet, hat diese einstige ,,*Pariser Handschrift*" nach langer Irrfahrt am 10. April 1888 in Heidelberg zum zweiten Male ihre Heimat wiedergefunden. Die althistorische Limmatstadt *Zürich* gilt heute wieder als ihre wirkliche Geburtsstätte. Hier waren tatsächlich der Ritter RÜDEGER MANESSE (gest. 5. September 1304) und sein Sohn JOHANNES, die man im 19. Jahrhundert unbegreiflicherweise für ,,nicht sonderlich verständig" und für ,,kritiklos" hielt, die Sammler der Lieder und Auftraggeber mindestens des Grundstockes der Bilder. Und mit ihnen können wir noch in unseren Tagen die Pflege und Freude an diesem unvergänglichen Monumentalwerk schönster deutscher Vergangenheit teilen. Im Zeichen heutiger deutscher Kulturerneuerung besinnen wir uns mehr denn je auf die Grundkräfte und eigene Wesenheit deutschen Geistes- und Gedankengutes in Kunst und Wissenschaft, auf die *volkseigenen* Anschauungen und Überlieferungen unserer kulturvollen Nation — in der richtigen Erkenntnis, daß das Wertvollste in uns nicht die Antike verwahrt, nicht die Romanen oder gar der Orient nach dem gern zitierten ,,ex oriente lux", sondern unsere ureigensten Volksschöpfungen mit ihren Ewigkeitswerten selbst, auf die wir um so stolzer sein können, je mehr wir uns nachempfindend in diese versenken. Kein Wunder also, wenn gerade in jüngster Gegenwart seitens deutscher Kunstgelehrter das Interesse an diesem „Manessischen berühmten Codex", wie GOETHE ihn nannte, von neuem erwachte — ein Interesse, das jedenfalls auch für den medizinischen Kulturhistoriker, schon aus *volksmedizinischen* Gesichtspunkten heraus, zu Recht bestehen dürfte. Denn merkwürdig genug: unter den 137 novellenhaften, malerischen Genrebildern aus einer höfisch-lyrischen Welt, die unmittelbar und unbefangen von urtümlichem, deutsch-minnesingerlichem Wesen und höfischem Rittertum um die Wende des 13. Jahrhunderts berichten, erscheinen ganz überraschend *drei* außergewöhnlich wertvolle *volksmedizinische Bildkompositionen.* Diese drei eigenartigen Sonderlinge heben sich derart aus dem gesamten großen Motivenmaterial der Handschrift heraus, daß man annehmen muß, hier war unter den vier beteiligten Malern zweifelsohne ein medizinisch besonders interessierter Künstler am Werk, der nicht bloß auf seine Buchseite schaute, sondern offensichtlich auch Anteil nahm an den Tageswirklichkeiten seiner Zeit. Seine aufschlußreichen, dem wirklichen Volksleben abgelauschten Bildrealitäten, diese seine mit erstaunlicher Treffsicherheit bis in alle Einzelheiten ausgeführten *Krankenporträtierungen* und Schilderung *chirurgisch-ärztlicher Heilbetätigung,* seine in echt völkisch-mittelalterlichem Geiste geschaute und gemalte *Badeszene* sind uns vielleicht noch wichtiger, als so viele andere konventionelle Typenbilder der gelehrten wissenschaftlichen Heilkunde vergangener Zeiten.

1. Der Wohltäter armer Volksgenossen, HESSO VON REINACH, *nimmt hilfsbedürftige Krüppel und Sieche in sein Haus auf.* (Fol. 113v.)

So ist gleich die erste volkstümlich-anschauliche Bilderzählung in ihrer nüchternen Präzision und erlebniswahren Verdeutlichung ein kleines Meisterstück medizinischer Kleinmalerei und Charakterisierungskunst (Abb. 1). Dies Blattbild ist eines der wertvollsten der ganzen Folge — nirgends sind dem anonymen Züricher Maler, ein meisterlicher Gestalter menschlicher Schicksale, die persönlichen Wesenszüge seiner Figuren so gut gelungen, wie hier: auf dem Schwellstein seines gastlichen Hauses steht der ritterliche Dichter und wohltätige Betreuer der Armen im Begriff, die von rechtsher nahende Bettlerschar von 8 armen krüppelhaften Geschöpfen bei sich aufzunehmen. Er hat bereits den vordersten gelähmten Bettlergreis an der Hand gefaßt, um ihn über die Schwelle zu sich hineinzuführen. Bis hierher mag sich der betagte Körperbehinderte, nur mit einem grünen Mantel bekleidet und gestützt auf seine Krücke unterm Arm, mühsam vorwärts geschleppt haben; er richtet, wie alle übrigen Leidensgenossen, seine Blicke hoffnungsfroh zu dem wohltätigen Herrn empor. Vorzüglich beobachtet und zeichnerisch wiedergegeben die von der Armkrücke abhängigen Körperbewegungen des einherhumpelnden Krüppels, sein verkürztes, nach auswärts schlaff herabhängendes linkes Bein in typischer Spitzfußstellung*. Wie charakteristisch porträtiert die durch Krankheit veränderten physiognomischen Züge des alternden und abgezehrten Mannes mit den zusammengepreßten Lippen und der hohen, kahlen Stirn. — Und dann weiterhin diese dem wirklichen Alltagsleben abgelauschte, in volksorthopädischer Hinsicht beachtenswerte Gestalt menschlichen Körperelends: der ganz vorn unten am Boden kriechende, hilflose Kranke, der gekrümmten Rückens, nur unter Zuhilfenahme zweier dreibeiniger Gehbänkchen, seinem Wohltäter mühselig zustrebt. Allein die ergreifendste Gestalt unter all den armen Geschöpfen bleibt doch diese inmitten der beiden krüppelhaften Kranken einherschreitende *blinde Frau* in rotem Gewand, die sich, gestützt auf die Schulter des vorangehenden Bettlergreises, zur gastlichen Freistätte hinführen läßt. Eine vorzügliche realistische Naturkopie, die wirkungsvoll die typischen Begleitsymptome des erlosche-

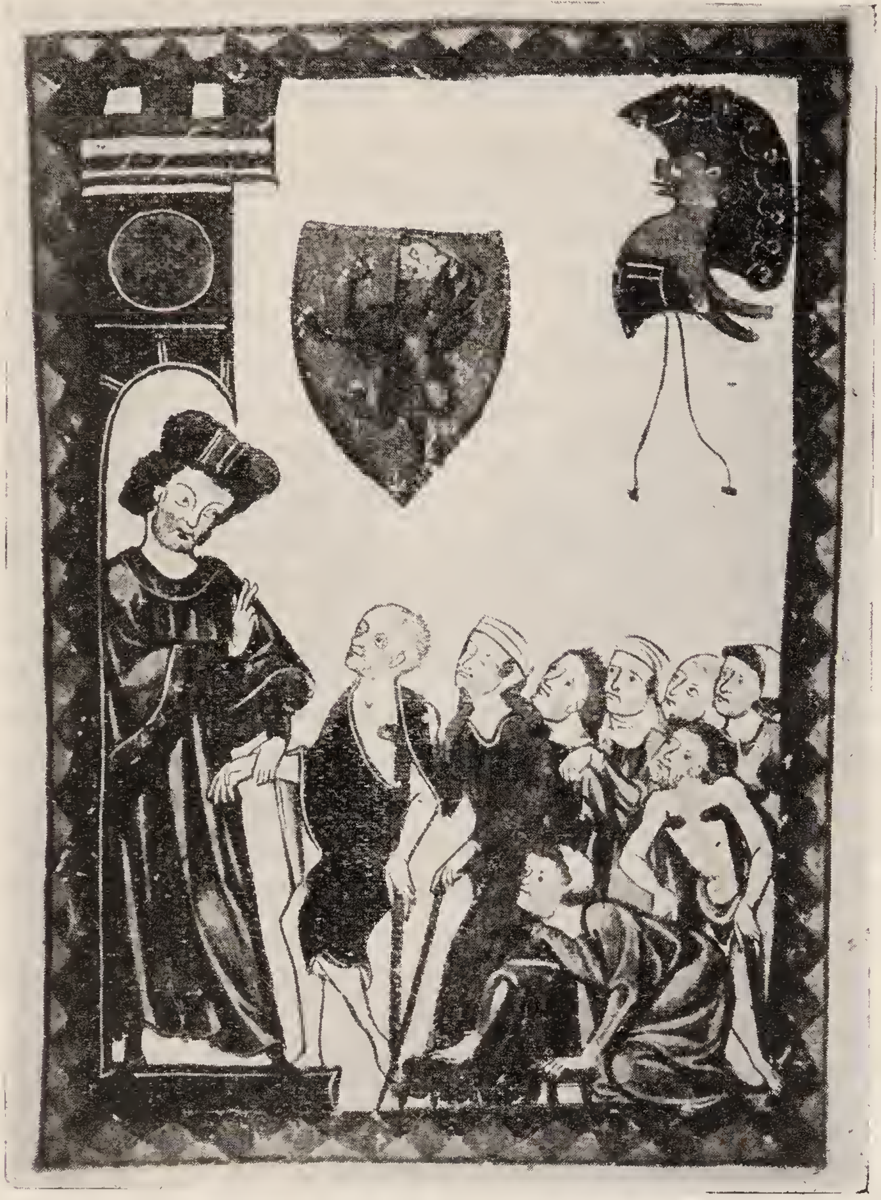

Abb. 1. Der Wohltäter armer Volksgenossen, HESSO VON REINACH, nimmt hilfsbedürftige Krüppel und Sieche in sein Haus auf (Fol. 113v).

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* Interessanterweise findet sich die gleiche Darstellung bereits vor 3500 Jahren auf einer Stele des syrischen Priesters RUMA, der eine akute Poliomyelitis durchgemacht hatte.

nen Blickes zum Ausdruck bringt: wie die schwer geprüfte Lichtarme mit ihrem Blindenstab vorsichtig tastend, in irdischer Finsternis dahinschreitet, ihre völlig geschlossenen, ausdruckslosen Augen, das Unbeholfene und Unsichere ihrer Körperhaltung, die mühevoll aufwärts erhobene Kopfhaltung. Das sind keine leeren, handwerksmäßigen Schemen, sondern lebensnahe Menschenzeichnungen, Schilderungen volkstümlicher Dramatik, wie sie nur die Erinnerung an Selbsterlebtes einzugeben vermag. — Aber auch die übrigen gut gesehenen Krankentypen, wie der fast nackte, ältere Bettler mit struppigem Haar, der auf zwei hohen Armkrücken einherhumpelt, weiterhin jene hilfsbedürftige Frau, die ihre gebrauchsunfähige linke Hand in ausgesprochener Lähmungsstellung absichtlich weit vorstreckt — sie zeugen gleichfalls von feiner Beobachtungskunst und verdienen somit vermehrtes krankheitshistorisches Interesse. — Es bleibt natürlich eine mißliche Sache, aus den dargestellten verkrüppelten Lebewesen die Ursache ihrer Körperdestruktionen herauslesen bzw. „hineingeheimnissen“ zu wollen. Unserem Maler dürften sie jedenfalls als geeignete Modelle in reichlicher Anzahl zur Verfügung gestanden haben; sie gehörten, Almosen heischend, in noch viel ausgedehnterem Maße wie heutigentags, zu den alltäglichen Straßentypen, die erfreulicherweise, dank unserer verbesserten Therapie und vorbildlich geregelten Fürsorgebetreuung, fast ganz aus dem Straßenbild verschwunden sind. — Allein in dem vorliegenden volkhaften Schicksalsbericht wird über das Alltägliche hinaus noch ein anderer, viel feinerer Sinn lebendig! Wirklichkeit und Idealismus sind schon hier wie im Heiltum unserer Zeit in eins aufgegangen. Die Darstellung soll uns tatsächlich mehr bedeuten, als nur eine nüchterne, konkrete Verbildlichung volksmedizinischen Gehalts. Unter den Händen des Malers verdichtet sie sich zu einer Verherrlichung jener im praktischen Leben sich allerwärts offenbarenden erbarmenden Karitas und gottgebundenen Humanität, die bekanntlich dem ganzen Mittelalter so recht eigentlich Antlitz und typische Prägung verlieh. Nun versteht man auch, weshalb der Maler nicht aus reiner Willkür (hierzu sind ihm auch die Gegenstände viel zu wichtig gewesen), sondern mit klugem Bedacht unseren Minnesinger als *geistlichen Herrn verkleidete.* Er läßt ihn als die Hauptfigur und den geistigen Mittelpunkt der Handlung — der Denkart mittelalterlicher Künstler entsprechend — die wesentlich kleiner gezeichnete Krankenschar um vieles überragen und diese nach kirchlichem Brauch mit dem feierlichen Handgestus segnen. Auffallenderweise gaben für die Erfindung und Auswahl dieses Bildmotivs* die dazugehörigen Lieder des Minnesingers, denen der Maler doch Rechnung tragen wollte, *keinen* Anhaltspunkt. Er und seine

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* Ein in der darstellenden Kunst aller Zeiten beliebtes und immer wieder variiertes Bildthema, wo es darauf ankam, eine der 7 christlichen Kardinaltugenden zu feiern.

Zeit wußten natürlich mehr als wir von der Lebensgeschichte und Eigenpersönlichkeit des ritterlichen Dichters aus aargauischem Adelsgeschlecht, für den als hervorragendster charakteristischer Wesenszug eben nur das Aufdecken und Sichtbarmachen seines opferbereiten, gläubigen Bekennertums und seiner volksverbundenen, idealischen *Gesinnung** in Frage kam. — Damit ist aber noch nicht alles gesagt! Aus unserem instruktiven Miniaturbild, das sich in seiner feierlich-religiösen Grundhaltung und Verklärung realärztlichen Beiwerks zu einem volkhaften, verpflichtenden *Symbol* aller Zeiten erhebt, lassen sich zwei weitere sehr bemerkenswerte Tatsachen ablesen. Einmal, daß um jene Zeit, wo an eine geregelte öffentliche Gebrechlichen- und Krankenfürsorge noch nicht zu denken war, neben den zahlreichen, dem frommen Sinn des Bürgertums entsprungenen Vereinigungen, auch im *Privathause der ritterlichen Kreise,* die stillen Taten der Barmherzigkeit für die seither mißachteten und verlassenen Volksgenossen geübt wurden. Ihre edle, opferbereite Privatinitiative trug natürlich wesentlich dazu bei, das harte Los der notleidenden Gebrechlichen und Siechen zu erleichtern und besser zu gestalten. Und zum andern offenbart sich unverkennbar im Bilde jener gewaltige geistige Anbruch deutscher Kulturerneuerung und *deutscher Gemeinschaftswirklichkeit* um diese Zeit: das bisher abseitsstehende Bürgertum — der recht eigentliche Träger und Hüter deutscher Eigenart — rückt in die Reihen des herrschenden Rittertums, die bevorzugte feudalistische Standesaristokratie findet sich zu den niederen Schichten der Bevölkerung. Mit dieser kulturell und sozial gleich bedeutsamen Verbindung zwischen Aristokratie und Volk ward das Gefühl der nationalen Zusammengehörigkeit gestärkt. Wenn auch nicht von langer Dauer, so entsprach dieser vorbildliche soziale Umschwung *wahrer deutscher Volksgemeinschaft,* in der wir uns auch heute wieder zusammengefunden haben.

2. *Chirurgische Behandlung einer Unterschenkelfraktur des Minnesingers von Sachsendorf.* (Fol. 158).

Das zweite, frisch aus dem Leben gegriffene, überzeugende Sonderbild läßt rasch erkennen, wie ehedem ein Chirurg seines verantwortungsvollen Amtes waltete (Abb. 2). Nur eine kurze Strophe im Liede des Minnesingers wählte hier der Maler für seinen medizingeschichtlich überaus wertvollen Wirklichkeitsbericht: *„in der dienst mir ab brach mîn bein und mîn vuoz“.* Kein Zweifel also, daß sich der jugendliche ritterliche Dichter wohl bei einem Turnier oder vielleicht eher als verliebter Sänger bei einem galanten Liebesabenteuer im minnelichen Frauendienst* seine schmerzhafte Unterschenkelfraktur zugezogen hatte. Wie ersichtlich, ist die dramatische Situation mit meisterlichem zeichnerischem Geschick und lebendiger Sachlichkeit erfaßt, als sei der Maler selbst dabeigewesen: auf einem gelben, maßwerkartig vorn durchbrochenen Podium ruht halb ohnmächtig der Unfallverletzte im Schoße seines grün gekleideten Freundes, der ihn fest umschlossen hält. Kopf und Arme bis hinab in die ausgestreckten Finger sind dem Verunglückten kraftlos zur Seite herabgesunken; sein unbekleidetes, verletztes Bein, bereits in einem Schienenverband fixiert, tritt unter dem roten Gewand hervor und findet eine sichere Unterlage auf dem vorgestreckten Knie des Arztes, während das andere als Zeichen des Schmerzes sich krampfhaft aufstemmt und hoch an den Körper herangezogen wird. — Wir können gut verstehen, daß der Künstler zur Hilfeleistung für den angesehenen Dichter aus aristokratischem Rittergeschlecht absichtlich nicht etwa einen Vertreter des niederen Chirurgenhandwerks hinmalte, diesen eigentlichen volkstümlichen Heilkundigen der damaligen Zeit, der sich vielleicht in den chirurgisch-handwerklichen Praktiken besser auskannte, als so mancher studierte Magister. Wie das Bild zeigt, schwebte ihm vielmehr der gelehrte, promovierte Akademiker in hohen Amt und Würden vor Augen — ohne Zweifel der gründliche Kenner der Pathologie seiner Zeit, der Repräsentant altüberlieferten Wissensgutes und hippokratisch-galenischer Heilkunst. Seine *chirurgischen* Kenntnisse dürfte er sich aus den Lehrvorträgen und Wundbehandlungsmethoden der damaligen, in aller Welt berühmten chirurgischen Professoren Frankreichs (Montpellier) erworben haben, da bekanntlich erst einhalb Jahrhundert später die erste *deutsche* Universität in Prag gegründet wurde. Und wie prächtig — der gewissenhaften ärztlichen Berufsarbeit fein abgelauscht — hat unser Maler diesen bereits bejahrteren und bärtigen Arztgelehrten hingezeichnet! Wie er sich in feierlich-kleidsamer Amtstracht seines purpurroten langen Doktormantels, auf dem Lockenhaupte das flache Pelzbarett mit herabhängendem grünem Bunde, eigens an der Lagerstatt des Patienten niederkniet, um in gespanntester Aufmerksamkeit mit seinen feinen, kundigen Händen ober- und unterhalb des Verbandes palpierend festzustellen, ob die Fragmentstücke auch vorschriftsmäßig in korrekter Stellung im Schienenverbande liegen. Freilich, ein derartig unzulänglicher Verband, wie ihn hier der Maler aufzeigt, ist heutigentags nicht mehr denkbar. In erster Linie sind schon die beiden Hauptgelenke ober-

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* Also auch hier ein interessantes, Bild gewordenes Beispiel für die Tatsache, daß in den altüberlieferten deutschen Dichtungen nicht einfach die Lebensgeschichte des Helden abgeschildert, sondern die Idealität desselben im Bilde geformt wird; die volksverbundene Gesinnung der Helden sollte sichtbar werden, die sie verpflichtete und die sich in ihren Typen auch verwirklichte.

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* Kennzeichnend für die kritischen Situationen, die der damalige „Frauendienst“ mit sich brachte, sind 2 Miniaturen in unserer Handschrift: ein schönes Burgfräulein läßt von der hohen Zinne ihres Altans an der Winde den in einem Korb sitzenden Minnesinger KRISTAN VON HAMLE nach einer Liebesnacht wieder zur Erde hinab. Und GRAF v. TOGGENBURG erklimmt eine hohe, steile Leiter, um zur Kemenate seiner Liebsten zu gelangen — — das „Kammerfensterln“ war also schon im 13. Jahrhundert gebräuchlich!

und unterhalb der Frakturstelle für die erforderliche Konsolidierung im Verbande nicht mit einbezogen; die Bruchenden werden hier nur zwischen Knie und Knöchel mit schmalen, gelbgefärbten Holzstücken (oder Leder?) fest zusammengehalten, so daß das Ganze viel eher den Eindruck eines improvisierten Notverbandes macht. — Und wie zu erwarten, wußte unser in medizinischen Dingen gut beschlagener Maler (vielleicht aus eigener Erfahrung), daß bei einer Frakturbehandlung nach damaliger Gepflogenheit vor allem auch *interne* — zumeist allerdings praktisch wertlose — Medikationen, Salben, Einlagen usw. zur Anwendung kamen. Er malte daher in wirkungsvoller Gegensätzlichkeit mitten in die dramatische Bildszene hinein eine jugendlich schöne Hilfespenderin, die, angetan mit weitem gotischem Gewand und weißer, enganschließender Kopfhaube, eine große goldene *Arzneibüchse* darreicht und dabei ihre Rechte dem verunglückten Dichter wie zur Beruhigung auf die Schulter legt. — Unwillkürlich stellt man angesichts des vorliegenden mittelalterlichen Verbandbildes Vergleiche an mit den volksmedizinischen Frakturbehandlungen vorauf-

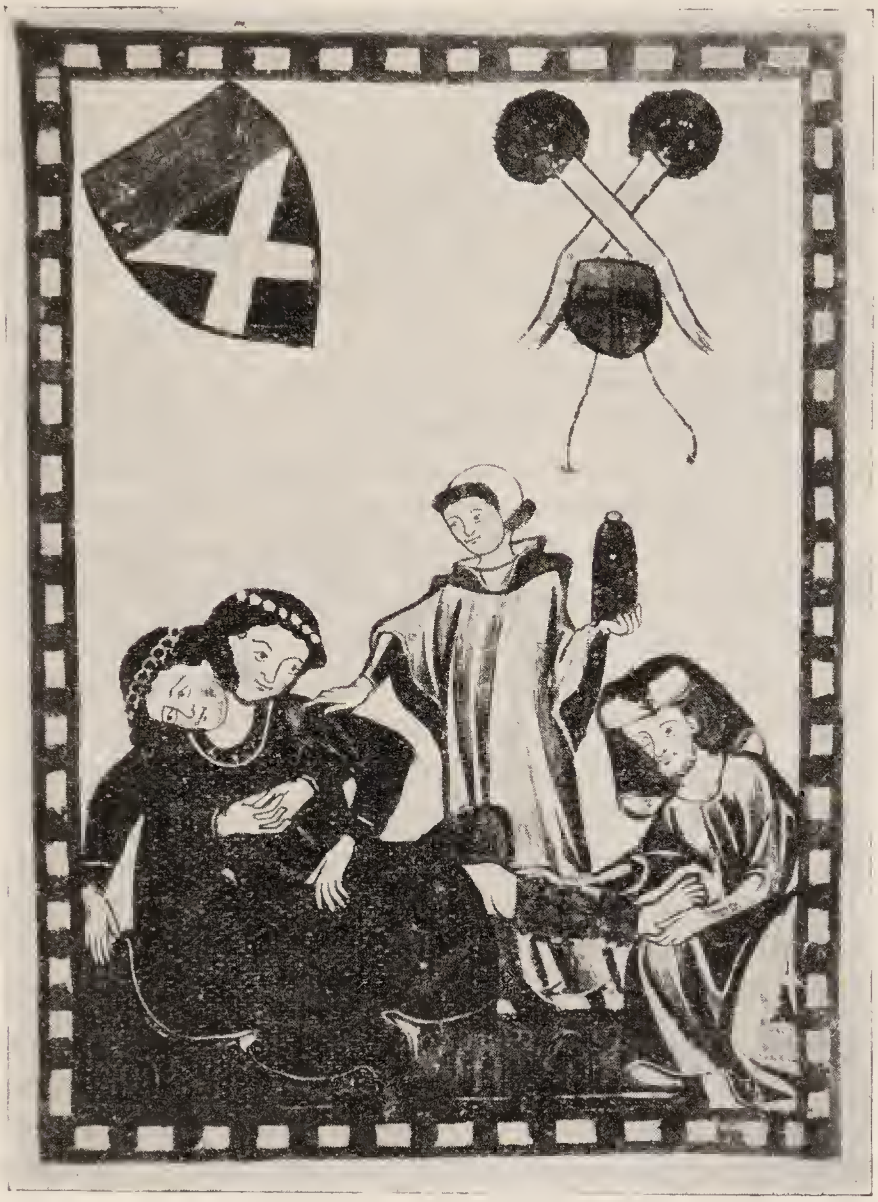

Abb. 2. Chirurgische Behandlung einer Unterschenkelfraktur des Minnesingers von SACHSENDORF (Fol. 158).

gehender Zeiten, erinnert sich, wie schon in der Frühzeit der *germanische Medizinmann*, dessen empirisches Wissen und chirurgisch-praktischen Erfahrungen trotz aller magisch-übernatürlichen Befangenheit, durchaus beachtliche gewesen sind, mit seinen geschickten „Heilhänden“ aus biegsamen Buchenholzstücken oder festen Weidenruten unter Benutzung von Baummoos als Polsterung und Salbenverwendung seine Knochenverbände kunstgerecht zu „schindeln“ verstand. Wie bereits vor 5000 Jahren die sicherlich nicht unbedeutende Chirurgie der *Ägypter* mit bestem Gelingen sich abzufinden wußte (das beweisen die zahlreichen gut verheilten Mumienknochen), lediglich aus Binsen und Baumrinden kunstgerechte Schienenverbände herzustellen. Und nun vollends die beispiellosen und unvergänglichen Leistungen der *Hippokratiker!* Ihr äußerst geschicktes Anlegen der verschiedenartigsten Verbände und Schienen, ihre auf vortreffliche Eigenbeobachtungen gestützte Lehre von den Knochenbrüchen, die bekanntlich in manchem noch für die heutige Medizin zu Recht besteht und die unser akademischer Medizinalgelehrter natürlich ausgezeichnet beherrschte. — Es wäre jedenfalls auch ein Irrtum — und das muß besonders betont werden —, wollte man angesichts eines einzigen, für unsere modernen Anschauungen unzulänglichen chirurgischen Verbandbildes in einer „Liederhandschrift“, nun gleich kritiklos den Wert und die Erfolge des deutschen Chirurgen im Mittelalter falsch und ungerecht beurteilen. Diese eine Stichprobe, noch dazu aus der Hand eines freischaffenden, medizinisch ungeschulten Buchkünstlers, gestattet noch kein allgemeingültiges, abschließendes Urteil. Begreiflicherweise, denn: es ist feststehende Tatsache und darf nicht vergessen werden, daß gerade um die Jahrhundertwende, die unsere „*Manesse-Handschrift*“ entstehen sah, die junge, vorwärtsdrängende chirurgische Wissenschaft neue, kraftvolle Antriebe erhielt. Altüberlieferte Vorlagen aus der Zeit des Hellenismus über Bord werfend, holte sich der Künstler mit wachsamem, weltoffenem Blick tatsächlich eigene, neue Bildmotive direkt in dem Berufsleben des wundärztlichen Meisters, im Operationsraume des Chirurgen, in den Kranken- und Spitalzimmern seiner Umwelt — samt und sonders volkstümlich — anschauliche Wirklichkeitsbilder von hohem medizingeschichtlichen Wert. Auch zugegeben, daß der damalige zünftige Chirurg alles andere eher war, als ein „gelehrtes Haus“ mit eigenen schöpferischen Ideen, der etwa die Feder besser geführt hätte als das Messer. Unbestritten war er aber, wie so mancher Handwerkermeister in damaliger Zeit, ein technisch gewandter und fortbildungseifriger *Kunsthandwerker* in seinem aus innerer Neigung erwählten Beruf. Geradezu gezwungen zu einer objektiveren Betrachtung der Dinge, ging er mit vorurteilsloser Frische an sein Werk und erfreute sich somit als *wirklicher Volksarzt* in weiten Kreisen seines kleinbürgerlichen oder ländlichen Klientels großer Beliebtheit und einer ansehnlichen Praxis. Und solche im Geiste alter werkgerechter Kunst schaffende deutsche Männer mit ihrem Meisterstolz, ihrer Meisterehre und Gemeinschaftsgeist brauchen wir heutigentags notwendiger denn je. Nach mittelalterlichem Vorbild hat sich die neue deutsche Volksgemeinschaft wieder auf den Adel, auf die gebührende Achtung vor dem *alten guten deutschen Handwerkerstand* mit seinem „goldenen Boden“ zurückbesonnen, aus der richtigen Erkenntnis heraus, daß derselbe für den ganzen Menschen ebensogut ist, als ein *akademischer* Beruf!

3. *Der naturbegeisterte Minnesinger Jakob von Warte im Bad unter freiem Himmel.* (Fol. 46 v.)

Auf den ersten Blick ein seltsames, ungewöhnliches Abbild (ganz zu schweigen von Porträtähnlichkeit, die von den Malern der Handschrift nie beabsichtigt wird) dieses freiherrlichen Ritters aus Thurgauischem Adelsgeschlecht und höfischen Dichters der hohen Minne, so wie ihn hier der Züricher Maler völlig nackt in einem hölzernen Badezuber zur Darstellung brachte* (Abb. 3). Und doch ist bei genauerem Zusehen diese Badeszene in Gegenwart dienstbereiter schöner Frauen in echt mittelalterlichem Geist empfunden und gestaltet und kann eben nur aus diesem Zeitgeist heraus richtig verstanden werden. Sie ist sicherlich auch kein willkürliches Phantasieerzeugnis unseres Künstlers, der offenbar besser als wir Bescheid wußte über die privaten Lebensumstände und Gewohnheiten der Dichter seiner Zeit und hier speziell über die besondere Vorliebe des naturfrohen Herrn v. Warte für Bäder in der schönen freien Gottesnatur. Im volksdeutschen Leben um die Zeit, da unsere „Manesse-Handschrift“ entstand, jedenfalls nichts Außergewöhnliches — im Gegenteil eine selbstverständliche und allgemein beliebte Gepflogenheit zu Zwecken der Körperpflege und des Vergnügens. — Dachte der Maler an die bekannte Badefreudigkeit des „*Tanhuser*“, dem er in der Handschrift ein prächtiges Bildnis in Deutschordensritter-Tracht widmete? Dachte er an *Wolframs* „*Parzival*“, dem bald nach seiner Ankunft bei *Gurnemanz* nach altem Brauche *deutscher Gastfreundschaft* (wie schon zu Zeiten Homers) zur Erquickung ein Bad bereitet wurde? Mag sein; allein worauf es ihm hier in erster Linie ankam, das war die nüchterne, alltägliche Bildrealität des warmen Wannenbades zu dem höfisch-lyrischen Minnedienst der damaligen Zeit in engste Verbindung zu stellen. Und das ist ihm — abgewandt den vielgezählten, herkömmlichen Vorbildern gleichen Sujets — in seiner köstlichen, gotisch verzierlichten Komposition vortrefflich gelungen! Tatsächlich durchtönt deutlich vernehmbar eine eigene volksliedhafte Melodie das realistisch abgestimmte Grundthema, verleiht ihm eine ausgeprägte poetische Stimmung, wie es in einer deutschen Liederhandschrift nicht anders denkbar ist: der blumige Rasenteppich, aus dem die hohe Linde mit ihren herzförmigen Blättern emporragt, die kleinen gefiederten Sänger, die in ihren Zweigen ein frohes Lied erklingen lassen, das mit frisch gebrochenen Rosen überstreute Wasser des Badezubers (angedeutet durch feinste Wasserspiralen), in dem der Dichter weit hervorragend Platz genommen. Und köstlich anzuschauen, wie sich ihm — so höfisch wie natürlich — anmutige Frauengestalten, eingehüllt in farbenfrohe, gotisch-weite Gewänder, nähern, um mit ihren Liebesbezeugungen dem alternden Dichter im grauen Haar im Bade aufzuwarten. Unbekümmert und doch in dezenter Zurückhaltung reichen sie ihm den wohlverdienten Dichterkranz aus roten Rosen und zur Labung während des Bades den großen goldenen Becher dar. Wie liebevoll und fürsorglich sich die dritte der edlen „vrouwen" in modischer Haartracht um den Dichter bemüht, die niederkniend mit zarter Hand zur Erfrischung von Haut und Muskel den Arm des Badenden *massiert*! Und mitten im Freien ist praktischen Sinnes zur Warmwasserbereitung gleich eine offene Feuerstelle errichtet; lodernd schlagen ihre Flammen unter dem schwarzen Wasserkessel empor, entfacht mit einem gelben Blasebalg in den Händen einer jugendlichen Dienerin. — So wandelt sich denn zusehends unser novellenhaftes Genrebild in seiner lyrischen Grundstimmung gleich einer Beethovenschen Sinfonie zu einem echt mittelalterlichen Hymnus auf die *Natur*, als das große Bekenntnis eines tiefsinnigen, starken Naturgefühls und zwangloser Naturfreude, die, wie einst in Homerschen Zeiten, ganz volksmäßig und gerade deshalb *medizinisch* um so wertvoller, dem damaligen idealischen deutschen Naturmenschen ein persönlich-beschauliches, heiteres, befreites Lebensgefühl und damit gesunde Lebenspflege und neue Lebenskraft vermittelte. Und zum andern wird uns die Badeszene zu einem aufschlußreichen, *medizin-kulturgeschichtlichen Zeitdokument* mittelalterlicher Volksgesundheitsführung und Badewesens, zu einer nützlichen Bilderzählung damaligen unbefangen *Sittenlebens**, wie dies eben nur jenen naiven früheren Jahrhunderten eigen gewesen ist — einer Zeit, die in dieser Beziehung vielleicht sauberer war, als die heutige. Möglich immerhin, daß sentimentale Moralisten unserer Tage selbst noch an Situationen, wie die vorliegende, Anstoß nehmen — Situationen, über die sich die lautere Denkart der früheren Zeit leicht hinwegsetzte und hier im Bilde als Ausdruck wirklichen „Minnedienstes" mit lüsterner Erotik wenig genug zu tun hatten. — Unsere heutigen Bestrebungen sind nur fördernd zu begrüßen, dieser seit altersher im deutschen volklichen Leben gepflegten Badekultur vermehrte Beachtung zu schen-ken. Die Volksgesundheitspflege durch Baden war dem deutschen Mittelalter jedenfalls geläufiger als uns Heutigen; die reichliche Verwendung der Bäder — in unserer Zeit besonders vordringlich in der *öffentlichen Gesundheitsfürsorge,* die das Mittelalter bereits im 14. Jahrhundert kannte — haben wir noch kaum erreicht! Ja, es muß eine unendliche Wasserlust die damaligen Jahrhunderte durchströmt haben, wohl nichts anderes, als ein wertvolles Erbstück unserer wasserfrohen, mit der Natur verwachsenen *altgermanischen Vorfahren,* denen nach übereinstimmenden Berichten römischer Schriftsteller das freie, ungezwungene Schwimmen in Flüssen und Seen bzw. das Baden in den warmen Hausbädern des eigenen Heims (man liebte zu Hause auch bereits das Dampf- und Schwitzbad) zur alltäglichen Gewohnheit geworden war. Um die angeblich tiefstehende Lebenshaltung und Lebenspflege, die vermeintliche „Halbwilde“ Volkskultur im einstigen *germanischen „Barbarenlande“* dürfte es also gewiß nicht so schlecht bestellt gewesen sein, wie leider immer noch in durchaus oberflächlicher und kritikloser Weise gefabelt wird. Man vergißt anscheinend, daß das alte *Germanien* bereits tausende Jahre v. Chr. eine sehr hochstehende Kultur besaß.

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* GOTTFRIED KELLER, der diese Badeszene in seine „Züricher Novellen“ (I, 96) einflicht, läßt den Dichter wegen der heiklen Situation, in der ihn das Bild zeigt, von der Gesellschaft gehörig geneckt werden.

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* Ein interessantes Seitenstück hierzu das auf Fol. 281v der Handschrift dargestellte Szenenbild, auf dem mittelalterl. Gepflogenheit entsprechend, eine völlig nackt im Bett liegende Dame den Besuch mehrerer Rittersleute ungeniert empfängt.

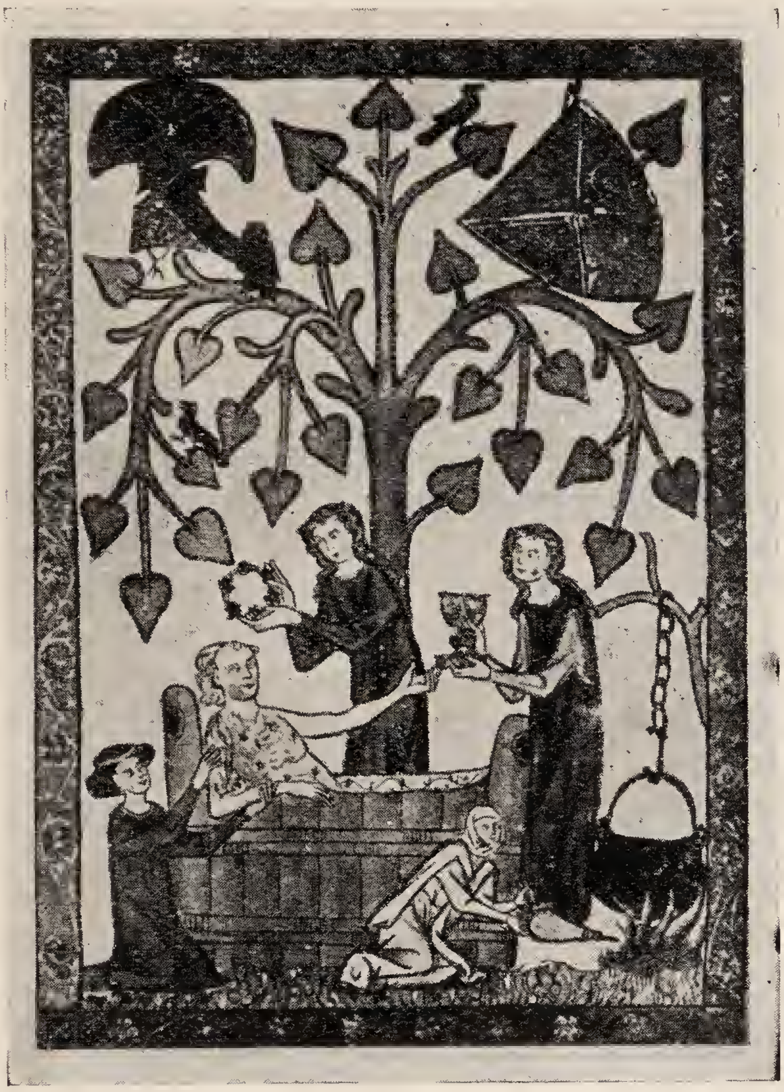

Abb. 3. Der naturbegeisterte Minnesinger JAKOB VON WARTE im Bad unter freiem Himmel (Fol. 46v).

Das ist in der Hauptsache, was uns diese drei eigenartigen Sonderlinge der Manesseschen Liederhandschrift — lebenswahre Erinnerungsbilder des unbekannten, medizinisch jedoch sehr bewanderten Züricher Künstlers — zu sagen haben. Die kostbare Handschrift, ein Symbol unserer Heimat, zählt zu den großen unvergänglichen Monumentalwerken der deutschen Nation; sie gehört jedenfalls auch in den Forschungskreis des *Medizinhistorikers*, wie die drei vorliegenden einprägsamen Blattbilder der Handschrift beweisen. Bereits vor mehr als 600 Jahren — im herrlichsten aller Jahrhunderte — gemalt, sind sie in ganz besonderer Weise auch dem volksverbundenen Arzt unserer neuen Zeit, der die Vergangenheit seines Vaterlandes kennen lernen muß, *nahegerückt*. Ein die Umwelt seiner Tage scharf beobachtender Realist des Lebens führte hier den meisterlichen Künstlergriffel; als Wirklichkeitsseher überlieferte er uns mit seiner medizinischen Kleinmalerei ganz unbewußt überaus wertvolle Sachlichkeitsbilder aus jener frühen Zeitwelt, die auch ohne die wundervoll erhaltene Farbenpracht der Originale, für die Historie der ärztlichen Kunst viel Anregendes und Besinnliches zu bieten vermochte: in veredelnder, künstlerischer Formung jene krankheitshistorisch aufschlußreiche *Volksszene*, die dem Maler nicht nur ein Abbild tiefsten Menschenelends und volkstümlicher Dramatik ward, sondern darüber hinaus zu einem verpflichtenden Sinnbild christlicher Humanität und volksverbundener Opferbereitschaft. Seine positive Sachlichkeit und feine Beobachtungskunst in medizinischen Dingen wurde fernerhin sichtbar in dem überzeugenden Bildreferat über die *Berufsarbeit des Chirurgen* am Lager des Unfallverletzten. Und nicht zuletzt jene poetisch-stimmungsvolle, von echt mittelalterlicher Naturfreude und tiefstem Naturgefühl zeugende *Badeszene* — ein in kulturgeschichtlicher Hinsicht lehrreiches Zeitbild völkisch-mittelalterlicher Badekultur, die wir Heutigen erst wieder ganz erringen müssen. Aus ihrer Zusammenschau und kritischen Deutung ergibt sich fast von selbst, daß wir jedenfalls allen Grund haben, auf die jahrtausendealten Heilerfahrungen und bewährten, trefflichen Volksheilweisen zurückzugreifen, wie es ehedem der deutscheste aller deutschen Forscher, der volksverbundene Einsiedelnerarzt PARACELSUS erfolgreich getan hat. Nach seinem glänzenden Vorbild besinnt sich das nationale Arzttum von heute wieder darauf, gesamtvölkisch zu denken und — um der einheitlichen Gesundheitsführung des *Volkes* willen — neben der streng-wissenschaftlichen Medizin vor allem *deutsches Volkstum und deutsche Volksheilkunde* bewußt zu pflegen, um zu neuen nutzbringenden Ergebnissen zu kommen.

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Die Lepra im mittelalterlichen Miniaturbilde

Eine medizingeschichtliche Rückschau an der Hand von sechs bisher unbekannten Originaldarstellungen im Text

Von

Dr. FRIEDRICH WEINDLER

Mit 6 Abbildungen

I. Das mittelalterliche Leprösenbildnis

Bereits seit den ersten christlichen Jahrhunderten treffen wir auf zahlreiche Beispiele der darstellenden Kunst, die Beziehungen zur Lepra haben. Dabei werden mit Vorliebe und ganz traditionsmäßig zwei biblische Personen, vor allem Hiob und der arme Lazarus, zu Trägern des Aussatzes gestempelt, obwohl ihre viel zu unbestimmten, nicht von Ärzten verfaßten Krankheitsgeschichten mit der Lepra eigentlich sehr wenig gemein haben. Es erscheint auch schon in Anbetracht der damaligen medizinischen Begriffe fast unmöglich, den zumeist recht unklaren Schilderungen vom Aussatz und den Aussätzigen die richtige Deutung zu geben. Mit dem Sammelnamen „Lepra“ bezeichnete man bekanntlich von altersher die verschiedenartigsten universellen Leiden und Schäden der Haut, unter denen vielleicht auch wirkliche Lepra im heutigen Sinn gewesen sein konnte. Es ist daher auch nicht besonders auffallend, daß die überwiegende Mehrzahl der mittelalterlichen Buchkünstler unzuverlässig war und sich offenbar damit begnügte, den „Leprösen“ so zu kennzeichnen, daß sie einen mehr oder weniger stark mit Flecken und Pusteln bedeckten Körper hinmalten¹). Also überaus primitiv-dilettantische Charakterisierungsversuche, denen irgendwelcher Wert in medizin-pathologischer Hinsicht nicht beizumessen ist. Der unbekümmerte Illustrator wußte aber genau, daß er selbst mit seinen schematisierenden Andeutungen der Krankheit im Volke sofort verstanden wurde, daß jedermann auf den ersten Blick die Schrecknisse der besonderen Krankheit aus dem Abbilde herauslesen mußte. Dabei ist es aber von größtem Interesse festzustellen, wie einzelne Künstler be-

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¹) Entgegen der Annahme E. HOLLÄNDERS in seinem bekannten Werk „Die Medizin in der klassischen Malerei“ finden sich schon in Leprösenbildnissen der älteren Perioden neben dem typischen Fleckenausschlag die mutilierenden Formen der Nervenlepra wiedergegeben. Wir verweisen unter anderem besonders auf die lebensechten Leprösenporträts Reichenauer Klosterkünstler des 9. Jahrhunderts hin; vergleiche hierzu FRIEDRICH WEINDLER, „Volksmedizin in den Wandmalereien des deutschen Mittelalters“ (Sudhoff Archiv für Geschichte der Medizin, 1937).

strebt sind, in ihren Bildkompositionen nicht einfach ältere Klischee gewordene Motive sklavisch nachzuzeichnen, sondern eigene neue Wege zu gehen, um ihre persönlichen Gedanken klar und bestimmt zum Ausdruck zu bringen. Über den Wortlaut des biblischen Textes hinaus überraschen sie gelegentlich mit selbständigen, der Wirklichkeit des alltäglichen Lebens entnommenen Zugaben, so daß tatsächlich die eigentlich symbolisch gemeinten biblischen Krankheitsbilder ganz in den Bereich menschlicher Anschauungen gerückt werden. An Stelle der schemenhaften „aussätzigen“ Einzelpersonen von ehedem erscheinen wirkliche und akute Bildhandlungen, die völlig dem Geist und dem Leben des Mittelalters angehören und in Volkskreisen jedenfalls eindringlicher und nachhaltiger in Erinnerung bleiben mußten. Es fehlt in diesen alltäglichen Lebensbildern auch nicht an ausgeprägten Gebärden für Schilderungen des hilfreichen Mitleids um den Kranken, an Gebärden für den Ausdruck der in der damaligen Laienwelt weitverbreiteten Furcht vor unmittelbarer Ansteckung, des körperlichen Schmerzes des Kranken u. a. m. Hierüber berichten — zuverlässiger als das Worte vermögen — eine Reihe seltener und bisher unbekannter Leprösenbildnisse mittelalterlicher Buchmaler. Zunächst ein syrisches Miniaturbild in der sogenannten Peschito-Bibel aus dem 12. Jahrhundert (Ms. syr. Nr. 341 der Pariser Nationalbibliothek, Abb. 1), das offensichtlich auf Jahrhunderte ältere hellenistische Vorbilder zurückgreift. Es zeigt den fast nackten Hiob, dessen Körperoberfläche mit lauter unbestimmten und wahllos verteilten roten Tupfen bedeckt ist. Vor ihm seine drei Freunde und zur Seite sitzend, Hiobs Weib, das ihm anscheinend in zwei Gefäßen Nahrung zugetragen hat. Und kennzeichnend für die persönliche Auffassung des freigestaltenden syrischen Buchmalers ist ihre Haltung, die offenkundig Trauer und Bekümmernis um den schwer Erkrankten verrät. Seine menschliche Auffassung steht jedoch in auffallendem Gegensatz zum biblischen Bericht (Hiob, 27, 1), nach dem Hiob von seinem höhnenden Weib mit Schmähungen überhäuft, ja sogar durch Ausspucken verspottet wird, wie das eine Reihe zeitgenössischer Bildwerke zur Darstellung bringen.

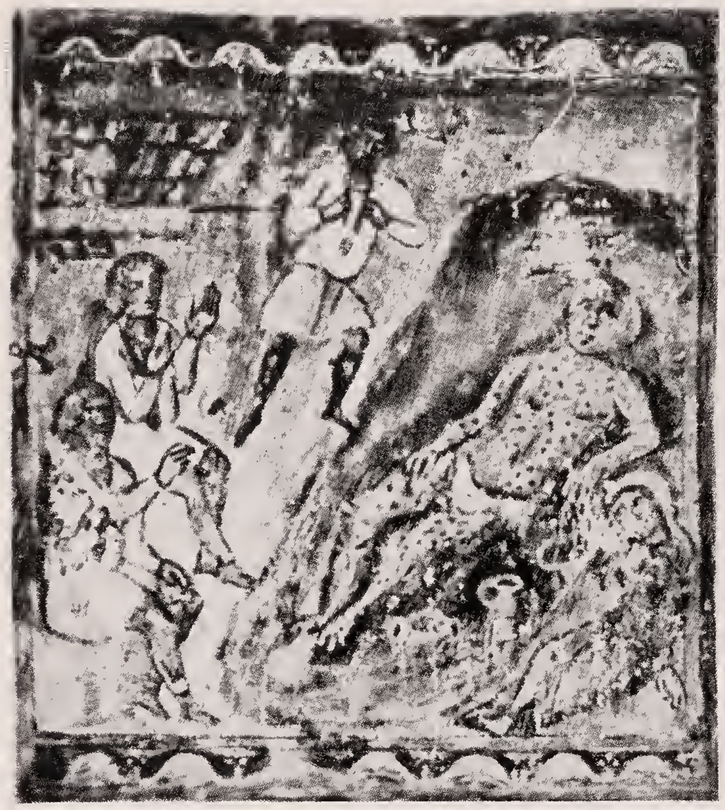

Abb. 1. Syrisches Miniaturbild (12. Jahrhundert). Der aussätzige Hiob und sein trauerndes Weib

II. Die Ansteckungsfurcht vor der Lepra

In den ältesten Urkunden ist die Lepra bereits als eine ansteckende und übertragbare Krankheit angesehen worden. Nur so läßt sich die geradezu beispiellose Furcht vor dieser Krankheit seit fast 3000 Jahren bei den Völkern bis auf unsere Zeit erklären. Das ist um so begreiflicher, als die Lepra derartig widerwärtige und deutlich sichtbare Entstellungen im Gesicht verursacht, daß selbst der ungebildete Laie die augenfälligen Merkzeichen der Krankheit unschwer erkennen kann. Und wie in der Geschichte zu lesen ist, hat man sich aus Furcht vor unmittelbarer Ansteckung schon von altersher nicht gescheut, die strengsten Schutz- und Sicherungsmaßnahmen zu ergreifen. Man hat besonders im Mittelalter mit rücksichtsloser Härte die Elenden ausgestoßen; sie schon durch äußere Zeichen als für die Volksgemeinschaft gefährlich gebrandmarkt. Um jede Möglichkeit einer engeren Berührung mit der Umwelt zu verhüten, wird schon im 8. Jahrhundert dem Aussätzigen an vielen Orten der Zutritt zur Stadt und der Aufenthalt verwehrt (daher das altdeutsche „ûzsetzic“ = der Ausgesetzte, abseits Wohnende). Man kennzeichnete ihn nach biblischer und kirchlicher Anschauung als „unrein“ oder gar als Sünder, der schon äußerlich in seiner verstümmelnden Krankheit die Strafe Gottes für vermeintliche Übeltaten zur Schau trug. Dahingegen wird wohl heutigentags allgemein angenommen, daß tatsächlich die Lepra nicht so leicht und nur unter ganz besonderen Umständen übertragen wird, daß höchstwahrscheinlich schon die einfachsten hygienischen Maßnahmen genügen, um überhaupt eine direkte Ansteckung von Mensch zu Mensch zu verhindern. — Von besonderem medizingeschichtlichen Interesse erscheint aber die Tatsache, daß nach ältester und in mittelalterlicher Zeit tausendmal wiederholter Anschauung die eingeatmete „böse und giftige“ Luft Lepröser eine Übertragung der Krankheit verursachen könne und daher vor dem Umgang mit Aussätzigen ebenso dringend gewarnt wird, als vor dem von der Pest befallenen Kranken. Schon im 2. nachchristlichen Jahrhundert vertritt der größte Therapeut des Altertums, Aretaios aus Kappadokien[1]), dem wir eine geradezu meisterhafte Krankheitsschilderung der Lepra („Elephantiasis“) verdanken, diese Ansicht und weist besonders auf die bereits damals weitverbreitete Furcht vor Ansteckung hin: „Wen möchte es wohl geben, der sich nicht aus Furcht vor Ansteckung von solchen Kranken abwendete, selbst wenn es Vater, Sohn oder Bruder

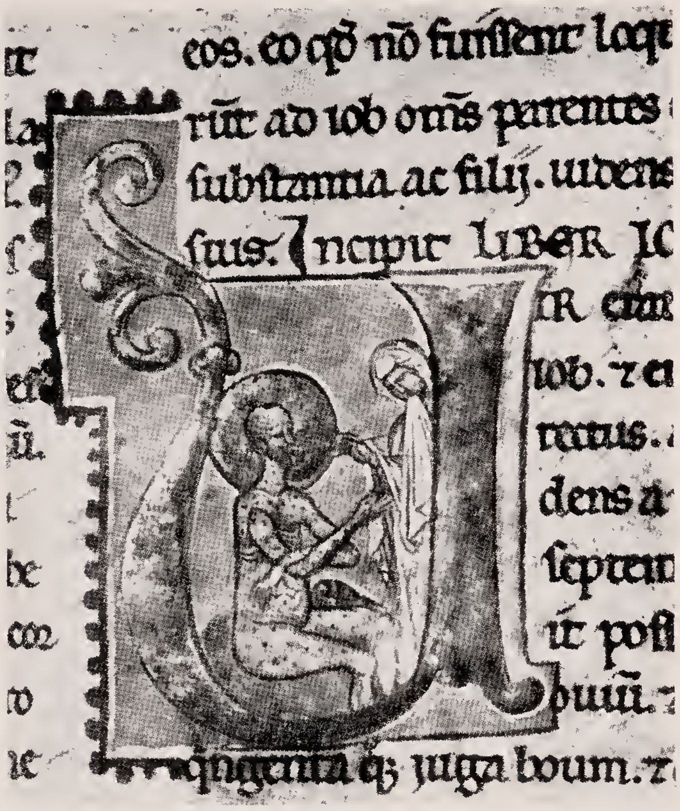

Abb. 2. Initiale V; Biblia sacra des 13. Jahrhunderts. Hiobs Weib schützt sich vor Ansteckung

wäre!“ — So nehmen denn auch bemerkenswerterweise einige seltenere Handschriftenillustrierungen des Mittelalters in realistischer Auffassung auf die alten Anschauungen Bezug; beispielsweise die Initiale V einer Biblia sacra des 13. Jahrhunderts (Abb. 2). Sie zeigt den ausgestoßenen, völlig nackten Hiob mit seinem unwirklichen universellen Fleckenausschlag. Nach alttestamentarischem Bericht (Hiob, 19, 17) weiß er selbst: „Mein Odem ist zuwider meinem Weibe.“ Sie tritt im Bilde ängstlich an den Kranken heran und reicht ihm, jede nähere Berührung vermeidend, mit Hilfe eines langen Stäbchens Nahrung. Um sich vor der Ausatmungsluft des Aussätzigen, als vermeintliche Quelle der Übertragung, zu schützen, bedeckt sie mit einem Zipfel des Gewandes ihren Mund. Also auch hier wieder eine dem alltäglichen Leben entlehnte Bildhandlung des selbständig schaffenden Buchmalers[1]).

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[1]) Vergleiche sein noch heute erhaltenes Werk: „Über die Ursachen und Zeichen der akuten und chronischen Krankheiten“, lib. II, cap. 13. Bekannt ist seine Krankheitslehre von dem atmosphärischen „Pneuma“ — eine Vorstellung, die sich bereits in der altägyptischen, der alexandrinischen Medizin, bei Galen („Lebenspneuma“) vorfindet und sich bis in das Mittelalter erhalten hat. — Weniger bekannt geworden sind die eindrucksvollen Krankheitsschilderungen der mutilierenden Form der Lepra des gelehrten Heinrich von Mondeville; in ihnen wird besonders auf eine Übertragung der Krankheit durch verseuchte Luft hingewiesen (vergleiche sein 1306 begonnenes scholastisches Handbuch der Chirurgie, Tract. 3, 17).

III. Tanta foeditas . . .

Ebenso widerwärtig wie das Aussehen pflegt auch der Geruch Aussätziger namentlich bei ausgedehnter Lepra tuberosa zu sein; man hat ihn wiederholt mit dem scharfen, durchdringenden Ziegenbockdunst verglichen. Diesen entsetzlichen Zustand schwer Erkrankter schildern bereits die ältesten Schriftsteller, so Cajus Plinius Secundus (23—79 n. Chr.) in seiner Naturgeschichte[2]) mit den bezeichnenden Worten: „Tanta foeditate, ut quaecunque mors praeferenda esset.“ Das wird verständlich durch die Tatsache, daß infolge des fast regelmäßig eintretenden und schnellen Geschwürzerfalls der leprösen Neubildungen stinkender zäher Eiter entleert wird, der geradezu einen pestialischen Geruch der Fäulnis verbreiten kann, besonders wenn noch obendrein eine stinkende Bronchitis oder Ozaena vorhanden ist. Er wird aber unerträglich im Endverlauf der Krankheit, in dem der Aussätzige den ekelhaften Geruch eines Leichnams ausströmt. — Wie die Atmosphäre in der Umgebung solcher Kranken gewesen sein mag, läßt sich aus der vielsagenden Gebärde des Nasezuhaltens ersehen, die mittelalterliche Buchmaler in ihren selbständigen Sachlichkeitsbildern anschaulichst wiedergeben. Wohl eine der ältesten hierhergehörigen Verbildlichungen findet sich auf einer Miniatur in der zwischen 880 und 886 zu Konstantinopel für den ersten makedonischen Kaiser Basileias und dessen Gattin Eudokia geschriebenen und mit Vollbildern von erlesener Pracht reichgeschmückten griechichen Handschrift der Homilien Gregoros von Nazianos (Ms. grec. Nr. 510, Fol. 71^{v} der Pariser Nationalbibliothek [Abb. 3]). Auf einem gelb bemalten Dunghaufen sitzt der bärtige und nimbierte Hiob, dessen Körperoberfläche in wahlloser

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[1]) Die älteste bisher bekannte hierhergehörige Darstellung findet sich auf dem berühmten Arkadensarkophag des Junius Bassus in den vatikanischen Grotten zu Rom aus dem 3.—4. Jahrhundert. Auch hier hält sich Hiobs Weib zum Schutz gegen Ansteckung ein Gewandstück vor den Mund. Sehr anschaulich ist überdies noch der bekannte Nürnberger kolorierte Einblattholzschnitt mit dem „Gastmahl der Sondersiechen“ (1493), wobei sich ein Beichtvater (kein Arzt, wie irrtümlich angegeben wird) mit einem vorgehaltenen Tuch vor Ansteckung zu schützen sucht.

[2]) Vergleiche das medizinisch sehr wichtige 25. und 26. Buch seiner „Naturalis historia“, in der wohl auf Grund eigener Beobachtungen der Aussatz (Elephantiasis) eindrucksvoll beschrieben wird.

Verteilung rötliche tupfenförmige Flecken aufzeigt, ihm zur Rechten seine drei Freunde in reichgemusterten Purpurgewändern. Von der anderen Seite naht sein Weib (in der Überschrift: *ΗΓΥΝΗΤΟΥ ΪΩΒ*) in einem langen blaufarbigen Gewand mit purpurnem Überwurf. Einen Teil desselben hält sie direkt vor die Nase, um sich vor dem abscheulichen Geruch des Aussätzigen zu schützen. Aus weiter Entfernung streckt sie ihm einen dünnen Stab entgegen, an dessen Ende nur noch das ringförmige Fragment eines Gefäßes erhalten ist, in dem sie wohl dem Kranken Nahrung herzugetragen hat. Es ist naheliegend, daß man die charakteristische Gebärde des Nasezuhaltens hin und wieder auch in zeitgenössischen Pestdarstellungen (z. B. bei Raffael, Poussin) antrifft.

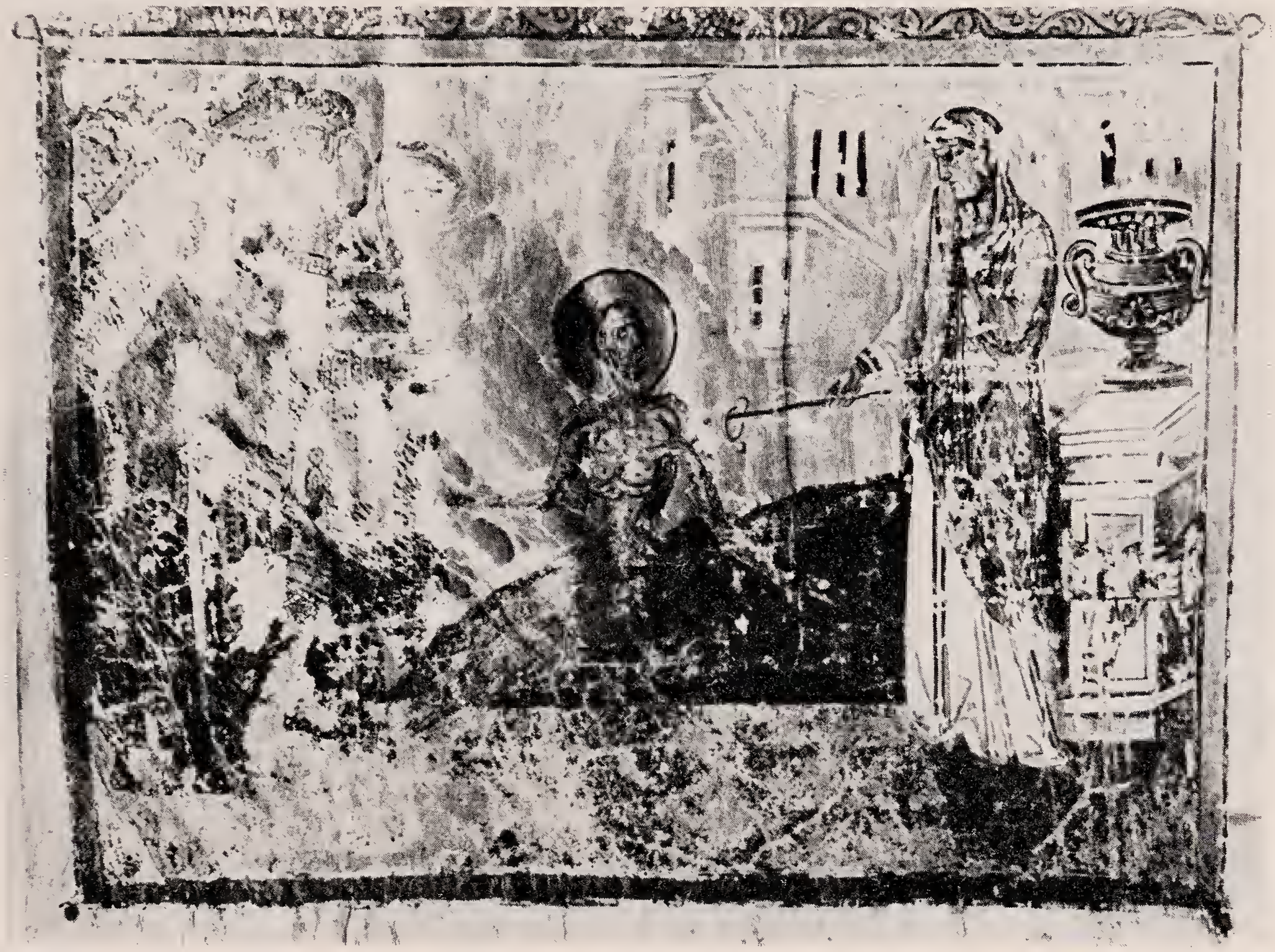

Abb. 3. Miniatur aus den Homilien Gregoros von Nazianos (9. Jahrhundert). Durch Nasezuhalten schützt sich Hiobs Weib vor dem Geruch des Kranken

IV. Der Juckreiz als kennzeichnende Begleiterscheinung der Lepra

Zu den Früherscheinungen in dem vielgestaltigen Krankheitsbild der Lepra gehört bekanntlich der lästige und hartnäckige Juckreiz, zurückzuführen, wie jedes andere der Lepra zugehörige Symptom, auf das Vorhandensein des Hansenschen Bazillus. Das Krankheitszeichen macht sich namentlich an den Beinen und Füßen bemerkbar und kann so unerträglich werden, daß auch das ständige Kratzen und Schaben dem Kranken keine wesentliche Erleichterung bringt. Aus der einzigen Angabe in der alttestamentarischen Krankheitsschilderung Hiobs (Hiob 2, 8), daß er eine Scherbe nahm und sich damit kratzte, kann man lediglich schließen, daß es sich bei ihm um eine juckende Hauterkrankung (ekzematöse Dermatitis) gehandelt haben mag. Dazu verdient bemerkt zu werden, daß man bereits in indogermanischer Urzeit für verschiedene krankhafte Erscheinungen auf der Haut die kennzeichnenden Ausdrücke „juckido“ (jucken) und „schavedo“ (schaben) kannte. — Einen auffallend sachlichen Geist bekunden ein paar selbständig arbeitende mittelalterliche Buchillustratoren, die in ihren Bildberichten eindeutig auf das Merkzeichen des Juckreizes in Hiobs Krankheit Bezug nehmen. Ein deutscher Mönchskünstler (Rainfridus) zeichnete mit der Feder auf die Versoseite des Vorsatzblattes einer lateinischen Handschrift aus dem 12. Jahrhundert[1]) den auf einem Matratzenlager liegenden Hiob mit seinem Weibe und den drei Freunden (Abb. 4). In der Rechten hält der hier merkwürdigerweise sehr jugendlich aufgefaßte Kranke einen scharfen Kamm, mit dem er sich die juckenden Pusteln am Oberschenkel kratzt. An Stelle der sonst üblichen runden kutanen Ausbrüche sind offenbar mit bestimmter Absicht Striche mit kleinsten Häkchen über die Körperoberfläche verteilt. Allem Anschein nach sollen diese „Kratzfüßchen“ die bereits aufgekratzten Hautpusteln veranschaulichen. In den einschlägigen Illustrierungen ist ein derartig originelles Sachlichkeitsbild nur einmal anzutreffen. — Der andere klösterliche Buchkünstler hält sich dagegen getreu an den oben angegebenen biblischen Krankheitsbericht (Abb. 5). In einer Miniatur der sogenannten Farfabibel des katalonischen, handschriftenreichen Klosters von Santa Maria de Ripoll (erste Hälfte des 11. Jahrhunderts, Fol. 163) schildert er sehr anschaulich, wie sich Hiob,

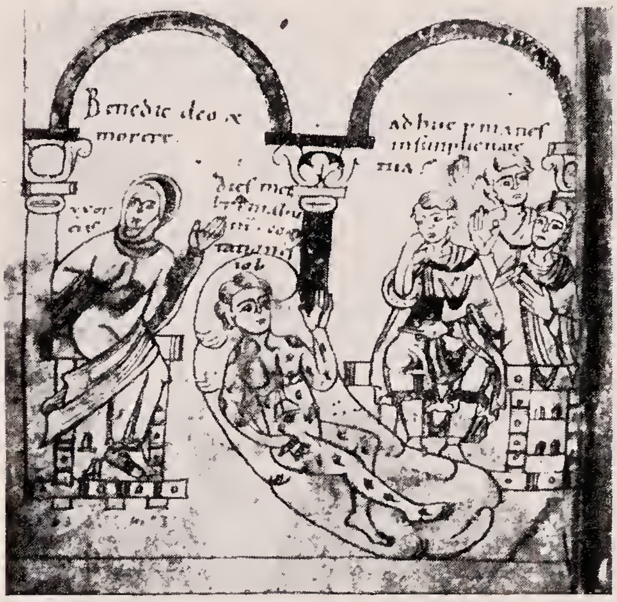

Abb. 4. Federzeichnung in einer lateinischen Handschrift des 12. Jahrhunderts. Das Merkzeichen des Juckreizes in Hiobs Krankheit

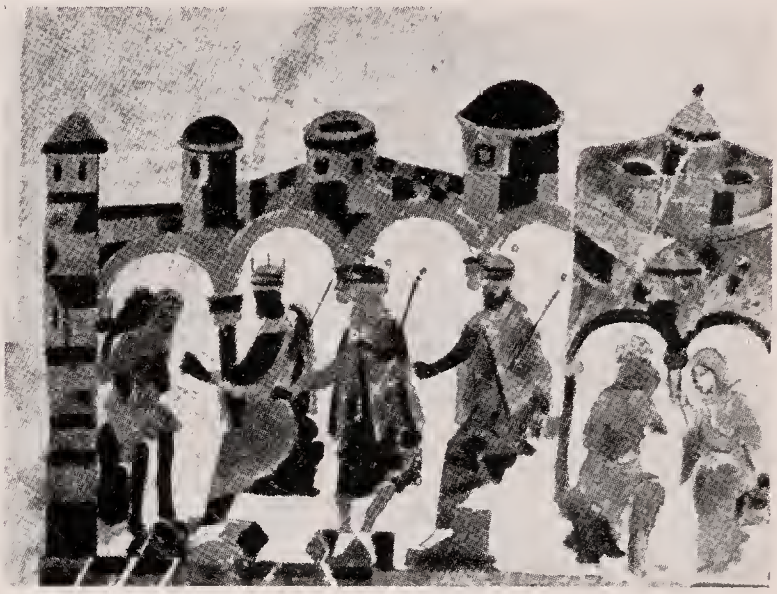

Abb 5. Miniatur in der sogenannten Farfabibel (11. Jahrhundert). Hiob schabt sich mit einer Scherbe seine Schwären

der auf einem hohen dunklen Erdhaufen sitzt, mit einer großen Scherbe „seine bösen Schwären schabt“. Als kleinste Einzelfigürchen erscheinen in der Umrahmung einer architektonisch wirkungsvollen Arkadeneinfassung wiederum seine drei Freunde. Daneben malte ein zweiter Miniator nochmals Hiob mit seinem Weibe. Wie dieses zurechtweisend den Finger erhebt und sich dabei ihrem Manne zuwendet, ist ganz vorzüglich nach dem Leben dargestellt. Überhaupt ist die vortreffliche Wiedergabe der Einzelgestalten das beste in der ganzen Ripoll-Bibel, obwohl ein ungeschickter Farbenauftrag nachträglich die Arbeit verdorben hat.

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[1]) S. Gregorius magnus, Moralia, Cod. Nr. 17 der Bibliothek des Zisterzienserstifts Stanz im Oberinntal. Über dem Haupt Hiobs stehen die Worte: „Dies mei breviabuntur.“ „Cogitationes Job“ (Hiob 27, 1). Links auf einem Stuhl sitzend, sein Weib („uxor eius“) mit Kopftuch und nur notdürftig bekleidet. Über ihr die wenig trostreichen Worte: „Benedic deo et morere“ (Hiob 2, 9). Rechterseits die drei Freunde mit der Überschrift: „adhuc permanes in simplicitate tua?“

V. Der Schmerz im Krankheitsbild der Lepra

Es ist in der Krankheitsgeschichte Hiobs zu lesen, daß seine Freunde mit ihm auf der Erde saßen und nichts mit ihm redeten, da sein Schmerz sehr groß war (Hiob 2, 13). Wie bei zahllosen anderen Krankheitszuständen, so zählen auch bei der wirklichen Lepra subjektive Schmerzempfindungen zu den ersten deutlichen Begleiterscheinungen der Krankheit. Vor allem handelt es sich hier um neuralgische Beschwerden, die im weiteren Verlauf nicht selten zu außerordentlich heftigen Schmerzanfällen im Gesicht und an den Gliedern führen können. Auf dieses charakteristische Krankheitsbild der leprösen Neuritis wird schon in dem obenerwähnten ältesten Schrifttum aufmerksam gemacht. Auf der Suche nach einer hierhergehörigen Bildurkunde in dem überall zerstreuten Illustrationsmaterial fand sich nur eine einzige, und zwar im Innern des Vorderdeckels einer lateinischen Handschrift aus der Mitte des 12. Jahrhunderts[1]) (Abb. 6). In voller Größe und über und über besät mit auffallend schematisch hingezeichneten kreisrunden Hautexanthemen liegt der völlig nackte Hiob auf einem mennigroten, über Stroh gebreiteten Tuch. Darüber kauert trauernd sein Weib, nur mit einem mennigroten Tuch um den Unterleib bekleidet. Zeichnerisch wirkungsvoll sind in der Tat die schmerzverzerrten Gesichtszüge des Kranken wiedergegeben, die schweres Leid ausdrücken, sein starrer, angsterfüllter Blick und die vor unerträglichem Schmerz zusammengepreßten Lippen. Seine Hände greifen nach dem Kopf, als ob ihm gerade hier die heftigsten Schmerzen peinigten.

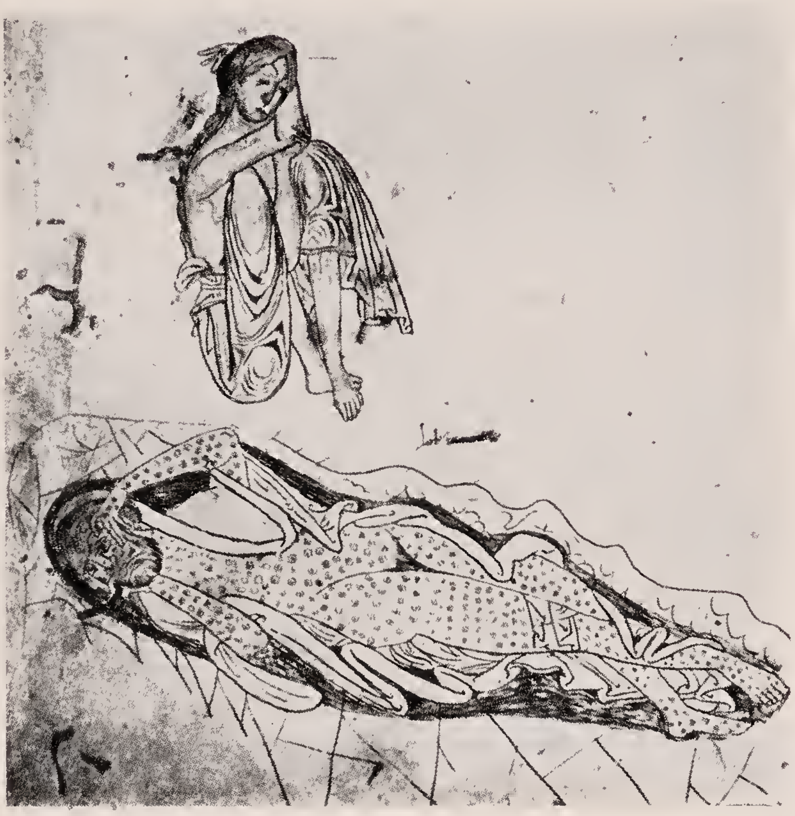

Abb. 6. Federzeichnung in einer lateinischen Handschrift des 12. Jahrhunderts. Das Schmerzenslager des aussätzigen Hiob

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[1]) Es handelt sich hier um eine Federzeichnung auf einem eingeklebten Pergamentblatt in der lateinischen Handschrift: S. Gregorius, Moralium in Job libr. I, Cod. 673 der ehemaligen Salzburger Hofbibliothek. Offensichtlich ist die antikisierende Darstellung auf eine viel ältere byzantinische Vorlage zurückzuführen.

Schließlich soll mit einem kurzen Wort noch der überaus zahlreichen Illustrierungen mit dem als aussätzig dargestellten Lazarus gedacht werden, der nach evangelischem Bericht (Lukas 16, 21) voller Schwären vor seiner Tür lag; „doch kamen Hunde und leckten ihm seine Schwären.“ Sie alle sind bildgewordene, medizingeschichtlich wichtige Hinweise auf jene uranfänglichsten, instinktiv-zweckmäßigen Heilhandlungen der Tierwelt, die bekanntlich auch primitive Völkerrassen als eine gegen die bösen Krankheitsdämonen gerichtete Maßnahme anwandten, um durch Auslecken der Wunden mit dem desinfizierenden Speichel die Krankheitsursache zu beseitigen.

Das Neue in den vorliegenden, eigens für die hauptsächlichsten pathognomonischen äußeren Krankheitsmerkmale der „Lepra“ ausgewählten Bildbeispielen liegt darin, daß hier einige wirklichkeitsbedachte Buchkünstler am Werk waren, die, unabhängig von den historischen Begebnissen, mit ihren selbständigen konkreten Einzelzeichnungen krankheitshistorisch wertvolle Bildhandlungen vor Augen führen. Sie nehmen jedenfalls eine ganz andere Richtung, als Tausende von immer wieder nachgezeichneten biblischen Krankheitsbildern. Das rein Menschliche steht hier im Vordergrund einer ganz bewußt positiv-sachlichen Darstellungsweise und darin gründet allein die besondere medizingeschichtliche Bedeutung der besprochenen „Leprösen“-Bildnisse aus einer frühen Zeitwelt. Nur allzugut kann man aus ihnen die Schrecknisse jener spezifisch mittelalterlichen Volksseuche ablesen; sie berühren aber darüber hinaus auch noch unsere gegenwärtige Zeit! Noch immer führen bekanntlich mehrere Millionen Aussätziger in allen Weltteilen ihr elendes Dasein, namentlich in China, Indien und Zentralafrika — also an den Stellen, von denen nachweislich im Altertum die Verbreitung des Aussatzes ausging. Jedenfalls steht aber das eine fest, daß durch die neuzeitlichen systematischen Behandlungsmethoden und spezifischen internen Medikationen die alte Lehrmeinung von der Unheilbarkeit des Aussatzes endgültig gestürzt ist.

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Alter Volksglaube und Volksbrauch in der Geburtshilfe des deutschen Mittelalters – und neue wissenschaftliche Erkenntnis

Eine medizin-kulturgeschichtliche Rückschau mit 2 Bildurkunden im Text

Von Dr. **Friedrich Weindler**, München

I.

Es ist wohl kaum mehr nötig, eingehender auf die enge Verbundenheit des mittelalterlichen geistigen und kulturellen Lebens, so auch der Heilkunde, mit religiösen Ideen hinzuweisen. Ihr allmächtiger Einfluß, der bereits bei antiken Völkern wirkungsvoll in Erscheinung trat, hatte seinen Höhepunkt erreicht. Die mittelalterliche deutsche Volkswelt lebte und webte in religiösen Erinnerungen. Demzufolge waren auch ihre Sitten und Gebräuche vielfach auf das innigste mit den religiösen Gepflogenheiten verschmolzen. Wohl auf keinem anderen Sondergebiet der Heilkunde zeigt sich das deutlicher und läßt sich im einzelnen genauer verfolgen, als gerade in der mittelalterlichen Geburtshilfe mit ihren jahrtausendealten volkhaften Überlieferungen, ihren geheimnisvoll-mystischen Entbindungsgebräuchen und allegorischen Zeremonien. Bei näherem Zusehen erscheinen sie jedenfalls in einem ganz anderen Licht als die bisherigen zumeist recht unklaren und unzureichenden Darstellungen. Hierbei ist zunächst die Tatsache von grundlegender Bedeutung, daß die mittelalterliche Kirche, die ja bekanntlich eine große, wundertätige Heilanstalt für Leib und Seele sein wollte, den tief in der Volksseele wurzelnden Glauben an das Wunderbare im Naturgeschehen auf das tatkräftigste zu fördern bestrebt war. Ein Glaube übrigens, der in ungebrochener Kraft bis in unsere Zeit weiterlebte und den selbst die fortgeschrittene wissenschaftliche Heilkunde unserer Tage nicht entbehrt und niemals wird entbehren können. Freilich lag die richtige Deutung eines Lebenswunders einer vergangenen, rein materialistisch eingestellten Ärztegeneration zum Teil noch recht fern! Über alldem ist auch nicht zu vergessen und soll deshalb hier ganz besonders hervorgehoben werden, in welch fürsorglicher und aufopfernder Weise sich jederzeit die Kirche gerade der Frauenwelt annahm und ihr in allen Lebenslagen ihre Hilfe anbot. Sie fand hierbei in gesteigertem Maße die unerläßliche gläubige Einstellung, die im ganzen Wesen einer Frau, in ihrer Gemütstiefe und religiösen Innerlichkeit gründet. Unter der mannigfachen Not jener Tage, insbesondere aber in den Fährnissen der Gravidität und Geburt, die man sich durch feindselige dämonische Mächte veranlaßt dachte, nahm die Hilfesuchende immer wieder Zuflucht zur Kirche, vertraute zuversichtlich dem suggestiven priesterlichen Zuspruch, glaubte an die Wirkungskraft kirchlicher Fürbitten, Gebete und Segnungen. Oft genug waren sie die einzigen und besten Arzeneien, die selbst der schlichtesten Gläubigen aus dem Volke täglich, ja stündlich zur Verfügung standen. — Aus Furcht vor unheilvoller dämonischer Einwirkung ließ man nicht selten schon das Ehebett vom Geistlichen segnen: »Benedic, domine, hunc thalamum!« Vor allem aber baten die Frauen zur Erlangung ehelichen Kindersegens um kirchliche Messen oder wählten als Fürsprecher bestimmte Heilige, da die ältere Zeit in der Sterilität der Frau eine Fügung göttlicher Vorsehung erblickte. Und bei eingetretener Gravidität konnte die hoffende Mutter erst recht des ständigen Beistandes der Kirche sicher sein. Schon für die Leibesfrucht, die sie trug, erhielt sie den kirchlichen Segen. Zumeist mag sie auch dem Rat der Kirche entsprochen haben, sich für die bevorstehende Geburt des Kindes durch Empfang der Sakramente vorzubereiten[1]. Stellten sich im Verlauf der Gravidität und der Geburt unerwartet größere Schwierigkeiten oder gar ernstere Zwischenfälle ein, bei denen Hebammenwissen und Hebammenkunst[2] nicht immer ausreichten, dann schenkte die angsterfüllte Frau nicht allein dem wirklichen Beistand der Kirche volles Vertrauen. Sie suchte und fand auch Trost und Halt in dem frommen Glauben an wundertätige überirdische Hilfe. Hierfür hielt die Hebamme, in deren Händen fast ausschließlich die damalige Geburtshilfe lag, eine Menge heilkräftiger Sympathiemittel, Beschwörungen und Gebete bereit. Aus den Ammenstuben der Vorzeit stammend, von Geschlecht zu Geschlecht überliefert, wurden sie von den »weisen Frauen« stets weiter empfohlen. Diese uralten Erinnerungen hat der konservative Volksgeist bis auf den heutigen Tag festgehalten. In ihrer Gesamtheit läßt sich deutlich ein alle Völker des Erdballs umfassender urtümlicher Entbindungszauber erkennen[3]. — Als gütige Retterinnen aus Geburtsnöten rief man wohl auch in gläubigen Gebeten und Segnungen anerkannte Geburtspatroninnen an, vor allem die hl. Margarethe, Katharina, Agathe, Anna u. a. m. Allein über allem stand doch die Glauben weckende, stets hilfsbereite Persönlichkeit des Priesters mit seiner besonderen Gabe des Heilens. Von der wundertätigen Segenskraft seines Wortes, seines heilkräftigen Zuspruches und seiner Gebete erwartete die Frau in den unmittelbaren Gefahren der Geburtsstunde die wirksamste Hilfe[4]. — Hierbei sei auch daran erinnert, daß in damaliger Zeit viele Kanzelredner und Volksprediger auftraten — unter ihnen der hervorragendste des Mittelalters, Berthold von Regensburg (1220—1272)[5] —, die in packender und für das Volk leicht verständlicher Sprache die hoffenden Mütter über ihre Pflichten aufklärten, die sie dem keimenden jungen Leben gegenüber zu erfüllen hätten, ihnen überdies gute Ratschläge für ein gesundheitsgemäßes Verhalten während der Schwangerschaft gaben, dabei besonders auch auf die mannigfachen Gefahren und ernsten Ereignisse hinweisend, die nicht selten den Frauen in ihrer schweren Stunde drohten. Ihren zumal in geburtshilflichen Fragen aufschlußreichen Ansprachen wendet notwendigerweise der Historiker der Heilkunde größere Aufmerksamkeit zu, handelt es sich doch hier um allgemein gebildete, oft genug selbst dem Volke entstammende Persönlichkeiten, die die hohen Werte des Volkstums und der Volksgesundheit erkannt hatten und danach handelten.

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[1] »So ain Fraw mit dem Khindt ist Gangen u. es der geburth genahet, hat ain Fraw beichtet u. das hayl. Sacramendt empfangen . . . und so sie in nöthen der geburth ist gesein, so hat man Gott u. die Muotter Gottes u. die Lieben Hayligen mit Trewen angeruofft.« (Näheres bei A. Franz, Die kirchl. Benediktionen im Mittelalter).

[2] Um diese war es im deutschen Mittelalter keineswegs so schlecht bestellt, wie das noch immer in geschichtlich unzutreffender Beurteilung behauptet wird. An anderer Stelle werden wir demnächst eingehender darlegen, daß bereits im 12. und 13. Jahrhundert tatsächlich eine dem damaligen Zeitbrauch angemessen entwickelte und fortschrittliche Geburtshilfe in Deutschland bestanden hat.

[3] Vgl. hierzu unsere früheren Arbeiten: »Geburts- und Wochenbettsdarstellungen auf altägyptischen Tempelreliefs«, München, C. H. Beck'scher Verlag 1915 und »Urgeburtshilfe« in Prakt. Ergeb. Geburtsh. **9**, H. 1.

[4] Für kreißende Frauen finden sich bereits im 10. Jahrhundert in liturg. und anderen von Klerikern verfaßten Handschriften zahlreiche, antiken Heilgebeten entlehnte, christianisierte Segensformeln und Fürbitten, deren Gebrauch außer Zweifel steht — z. B. das Gebet »pro dolore partus, ut prospere et sine gravi dolore parturiat«; die Benediktionen »ad partum mulieris« oder »ad mulieres iacentes in partu« u. a. m. Sogar in Lehrbüchern der Heilkunde werden derartige Heilgebete wie ein Rezept verordnet. Zwei besonders charakteristische deutsche Fürbitten lauten: »Fur alle schwanger christen frawen, daz sey unser herr gnedicklich entbind u. inen verlyh ein frolichen anblitz irer geburt« und »Über alle swanger Frouwen, daß si Gott welle erfröwen mit aim frölichen anblicke irer geburt (vgl. Falk, Die Ehe, 5; E. Weymann, Geschichtsfreund, 127).

[5] Deutsche Predigten I. Unter vielem anderen findet sich in Berthold's berühmten und in zahlreichen Handschriften erhaltenen Kanzelreden die für uns heute ganz geläufige Vorschrift: »Die 6 Wochen, so die Frouwen im Kindelbette liegen, sollst du sie nicht berühren.«

II.

Aber nicht nur das gesprochene, sondern auch das geschriebene oder gedruckte Wort spielte in der Frauenwelt der vergangenen Jahrhunderte eine sehr wichtige Rolle. Genau wie heute suchte sie sich in belehrenden Medizinbüchern, in ärztlichen Haus- und Familienratgebern über geburtshilfliche Dinge eingehender zu unterrichten. Den wissensfreudigen Volkskreisen standen bereits eine größere Zahl für den Hausgebrauch zusammengestellter volkstümlich-medizinischer Schriften zur Verfügung, teils anonym, teils unter dem hohen Namen ärztlicher Berühmtheiten geschrieben. Ein weitverbreitetes und beliebtes Frauenbüchlein war die »Trotula Mulierum« (nach 1100), wie das textlich größtenteils auf antiker Überlieferung aufgebaute gynäkologische Werk handschriftlich wohl heißt. Seine heutige Gestalt hat es in nachkonstantinischer Zeit erhalten und führt lediglich den Titel »Trotula«[6] (Diminutiv des deutschen Drude). In interessantester Weise mischen sich hier die besten geburtshilflichen Überlieferungen des Altertums mit ältestem Volksglauben und Brauch, mit noch heute in unserer Volksmedizin üblichen natürlich-magischen Heilverfahren. In ihrer Wirkung seien sie zwar dunkel, allein in Hebammenkreisen ständig in Gebrauch. Vernünftigerweise werden die Frauen in Geburtsgefahren zunächst auf die göttliche Hilfe verwiesen. Demgemäß beschränken sich die praktischen Maßnahmen lediglich auf beruhigende Bäder und Tränke mit allerlei Zusätzen, schmerzstillende Räucherungen, Einsalbungen des Leibes u. a. m. Man ist auch nicht überrascht, hier dem uralten Steinzauber als geburtshilflich wichtigem Heilmittel zu begegnen. Freidank sagt mit viel Recht in seiner »Bescheidenheit« (verfaßt zwischen 1228 und 1229): »Kraut, Gestein und Zauberwort haben an Kräften großen Hort!« Bereits vor Jahrtausenden waren unsere germanischen Vorfahren der gleichen, echt volkstümlichen Überzeugung, daß im Gestein und Fels und in den Gegenständen wunderwirkende Kräfte verborgen sind, die zu den Menschen in einflußreicher Beziehung stehen. Und im Trotula-Frauenbuch des 12. Jahrhunderts wird der schon von Plinius erwähnte Adlerstein, an dem Schenkel der Kreißenden befestigt, als wirksames, wehenbeförderndes Hilfsmittel anempfohlen. Buntfarbige Korallen, denen eine dämonenabwehrende Kraft innewohnt, vermögen als Amulett um den Hals der Kreißenden getragen, eine leichte Geburt herbeizuführen. Vor allem aber gilt ein gewöhnlicher Magnet in der Hand derselben als besonders kräftiges und erfolgreiches Mittel, ihr eine glückliche und schnelle Geburt zu sichern. Unverkennbar klingen in dieser anscheinend seltsamen geburtshilflich-praktischen Maßnahme letzten Endes die Grundgedanken der Mesmer'schen Magnetotherapie wieder, die im 18. Jahrhundert von der wissenschaftlichen Heilkunde weit ins Volk eindrangen und auf die Volksseele den tiefsten Eindruck machten. Wir wissen, daß auch der große deutsche Volksarzt Paracelsus die besondere Heilkraft des Magnetismus anerkannte, der bekanntlich die Entdeckung der Hypnose bringen sollte. Und als wirkungsvolle Heilmaßnahme spielt er noch heutigentags eine überaus wichtige Rolle. Die nachweisbaren Erfolge gründen heute wie ehedem in der suggestiven Kraft des Heilverfahrens, also in der rein seelischen Beeinflussung des Kranken[7].

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[6] Das Buch »Trotula« hat bestimmt nichts mit dem Namen einer Salernitaner Ärztin zu tun, wie noch so häufig zu lesen ist. Überraschend ist jedenfalls die Empfehlung des seit Soranos gänzlich in Vergessenheit geratenen Dammschutzes; außerdem findet sich hier die erste Erwähnung eines totalen Dammrisses (vulva et anus fiunt unum foramen) und dessen Vereinigung durch die Naht (vgl. Trotulae curandarum aegritudinum muliebrium ante, in et post partum libellus, Lipsiae 1778, c. 16 u.17. Früher erschienen Venet. 1547 u. 1554.

Ebenso wichtig für die Bedeutung der deutsch-volklichen Geburtshilfe im 12. Jahrhundert scheint uns die bekannte »Physica« jener seltenen und hochgebildeten Frau des hohenstaufischen Zeitalters, der heilig gesprochenen Hildegard (1098 bis 17. IX. 1179), Äbtissin zu St. Rupertusberg bei Bingen und zugleich weitberühmte Ärztin im Bereich dieses von ihr gegründeten Benediktinerinnenklosters. Ihr zwischen 1151 und 1159 verfaßtes und viel gelesenes naturkundlich-medizinisches Werk wirkt heute fesselnder denn je![8] Die fromme und seherisch veranlagte Klosterfrau, die hier nicht als Gelehrte, sondern als Stimme eines ganzen Volkes redet, will es in Visionen eingegeben empfangen haben. Daher mag es wohl auch kommen, daß ihrer eigenen Zeit schon das Schwere und Dunkle ihrer Sprache nicht leicht verständlich war. Aber wichtig genug: was sie schrieb, ist in Wirklichkeit echt deutscher Volksglaube und volksverbundene Wissenschaft, ist eine charakteristische Mischung von antikem Wissensgut und deutschen volkstümlichen Heilerfahrungen. Als echtes Kind ihrer Zeit weiß sie um die innerliche Zuneigung des Volkes zu den natürlich-magischen Heilkräften und zu den verschiedensten Sympathiemitteln. So beherrscht denn auch in der »Physica« wie im Trotula-Buch der Steinzauber die zahlreichen Heilanweisungen und guten Ratschläge bei Gravidität und in der Geburt. Beispielsweise vermag ein Jaspis in der Hand der Kreißenden die drohende schwierige Entbindung zu erleichtern. Durch die magische Kraft eines im Gürtel[9] der Gebärenden verwahrten oder vor die Vulva gehaltenen Sardius würden sich »Wege und Tor öffnen, aus dem alsbald das Kind ohne zu sterben hervorginge und ohne die Mutter zu töten«. Bemerkenswerterweise wird auch von einem massierenden »Streichen« des Leibes der Kreißenden gesprochen[10], also von einer wirklichen volksüblichen Hilfeleistung, die Austreibung der Frucht zu beschleunigen bzw. zu erzwingen, jenem uranfänglichsten, einfachsten und naturgemäßen Gebärbehelf, der seit Jahrtausenden bei allen Völkern eine hervorragende Rolle in der Geburtshilfe gespielt hat und heutigentags noch spielt. Im modernen wissenschaftlichen Gewande kennen wir ihn als äußere Wendung, Credé'schen und Kristeller'schen Handgriff. — Unsere mittelalterliche Krankenheilerin weiß überdies auch gut Bescheid in den heilsamen Eigenschaften der bekanntesten Tiere! Wenn sie freilich von einem »Löwenherz« spricht, das man kreißenden Frauen in den Stunden harter Bedrängnis zur Beschleunigung der Geburt auf dem Leib befestigen soll, so kann ihre Verordnung wohl nicht anders verstanden werden, als daß sie an ein heilkräftiges Steinamulett mit der Nachbildung eines Löwenherzens dachte. Denn woher im geeigneten Moment gleich ein wirkliches Löwenherz auftreiben? Hierbei braucht nur an ähnliche dämonenbeschwörende Steinamulette aus dem Tierreich erinnert zu werden, die bereits in germanischer Vorzeit angefertigt und getragen wurden. Jedenfalls lebt in dieser praktisch-geburtshilflichen Maßnahme der uralte suggestive Glaube an die Heilkraft tierischer Organe wieder auf, der mit den Opfer- und Tierkulten frühester Zeiten in unmittelbarer Beziehung steht. Und wie in Paracelsischen Ideen, so findet tatsächlich auch in der neuzeitlichen Organtherapie für Gesunde und Kranke die alte volkstümlich-therapeutische Verwendung heilkräftiger Tierorgane, die man sich ehedem als Seelen- und Lebensträger vorstellte, wieder erhöhte Bedeutung[11]. Nur den noch im 19. Jahrhundert lebenden Ärzten mit ihren unzulänglichen mechanistischen Anschauungen erschienen bezeichnenderweise diese Dinge unvereinbar mit aller Wissenschaft!

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[7] Der uralte Steinzauber will medizingeschichtlich jedenfalls ganz anders verstanden werden, wie das vielfach noch im heutigen Schrifttum zum Ausdruck kommt, so z. B. im »Grundriß zum Studium der Geburtshilfe« von E. Bumm, 1912, S. 4.

[8] Der ursprüngliche Titel der »Physica sanctae Hildegardis« — eine Bezeichnung, die vermutlich von dem ersten Straßburger Herausgeber Johannes Schott 1533 herrührt — lautete wahrscheinlich: »Liber subtilitatum de diversis creaturis« (Wolfenbütteler Handschrift, 2. Hälfte des 13. Jahrhunderts). Es bleibt zum mindesten unverständlich, daß diese für die deutsche Volksmedizin hoch bedeutsame Schrift nach dem Vermerk im Handbuch der Geschichte der Medizin I, 634/635 kein »eigentlich medizinisches Interesse« hätte und als »Machwerk« anzusehen sei.

[9] Die Erwähnung eines »Gürtels« für Kreißende ist in medizin-kulturgeschichtlicher Beziehung jedenfalls sehr aufschlußreich. Während ihm nach uraltem Völkerglauben rein mystische Beziehungen zu der Gottheit zugeschrieben wurden, um von der Kreißenden schädliche Dämonen fernzuhalten, erscheint im späteren Mittelalter bis auf den heutigen Tag das Anlegen eines Gürtels in Gestalt einer breiteren Leibbinde als ein überaus wirksames mechanisches Hilfsmittel, die Geburt zu beschleunigen.

[10] Hierfür hatte man im 13. Jahrhundert die treffende Bezeichnung »slifen« (d. h. schleifen, mit der Hand herabgleiten), die unzweifelhaft auf ein zielbewußtes, kunstgemäßes Vorgehen der damaligen Hebammen hinweist (vgl. H. W. Freund, Klinisches Jahrbuch III, S. 39).

Als wichtigstes Endergebnis unserer wissenschaftlich begründeten Ausführungen ist zu erkennen, daß die Frauenwelt des Mittelalters namentlich bei den ernsteren Ereignissen in der Gravidität und Geburt nicht nur dem suggestiv wirkenden priesterlichen Zuspruch volles Vertrauen entgegenbrachte, sondern im Glauben an die Realität der Wirkung besonders auch wundertätigen übernatürlichen Heilgebräuchen zugeneigt war. Wer wollte bezweifeln, daß ohne den festen Glauben an das »Wunderbare« im Naturgeschehen, das mächtiger ist als jeder Zweifel, selbst die fortgeschrittene Gegenwartsheilkunde denkbar ist? Die zahllosen volksüblichen magischen Mittel mögen vielleicht auf den ersten Blick unerklärlich erscheinen; ihre mit den Sinnen nicht faßbare heilsame Wirkung wird jedoch von der Erfahrung bestätigt. In den Grundgedanken stehen sie jedenfalls wissenschaftlichen Heilmethoden unserer Zeit nicht fern; sie finden nur in einem anderen Sinn und in anderer Form zum guten Teil heutigentags offizielle Anwendung. Das Hauptsächlichste bleibt aber doch, aufs neue bestätigt zu sehen, welch außerordentlich hohe Bedeutung das deutsche Mittelalter der psychischen Beeinflussung des menschlichen Seelenlebens zuschrieb, wie sich die Volkskreise namentlich auch in geburtshilflichen Dingen immer wieder beachtenswerte psycho-therapeutische Heilmaßnahmen nutzbar zu machen suchten. Deutlich genug verknüpfte ein enges gemeinsames Band bereits für die damalige Vorstellungswelt leibliche und seelische Krankheiten. Zu dieser wichtigen Erkenntnis — nicht bloß den sogenannten »kranken Menschen«, sondern darüber hinaus die kranke Seele zu heilen — ist die wissenschaftliche Forschung erst nach Ablauf vieler Jahrhunderte wieder gelangt. In diesem Zusammenhang können die wahrhaft erstaunlichen Heilerfolge psychischer Behandlungsmethoden, deren sich jeder Arzt bedienen sollte, nicht übersehen werden, die heute ernste wissenschaftliche Forscher selbst bei echten Organkrankheiten aufzuweisen haben und bisher für unmöglich gehalten wurden. Die hierzu erforderliche erhöhte seelische Bereitschaft gewinnt gerade im frauenärztlichen Wirken eine entscheidende Bedeutung. Mit verstandesmäßigen Überlegungen und mit dem Wissenschaftlichen allein ist es in der Sprechstunde, am Geburts- oder Krankenbett nicht getan: Das weiß jeder einsichtige und gut beobachtende Frauenarzt, der natürlich selbst, um heilen zu können, an die Seele seiner Kranken, an die heilenden Naturkräfte glauben muß. Tatsächlich offenbaren sie sich ihm tausendfach in täglichen Lebenswundern! Seine seelische Einfühlung in die Kranke und ihre Umgebung, sein starker, Vertrauen weckender persönlicher Einfluß kann geradezu Wunder wirken. Es ist doch sicherlich kein Zufall, daß die älteste deutsche Bezeichnung des Arztes »lâhhi« bzw. »lâchenaere« lautete, die nichts anderes als »Besprecher« bedeutet.

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[11] Hierbei ist auch darauf hinzuweisen, daß man in der Volksmedizin und der wissenschaftlichen Heilkunde der Vergangenheit (und wieder in unserer Zeit!) auf Grund reiner Erfahrungstatsachen lebende tierische Körper für therapeutische Zwecke verwendete, indem man sie erkrankten Körperteilen auflegte. Von Celsus (De medicina) wurde der Genuß von Hasenfleisch und Hasenblut als wirksames Heilmittel der Sterilität und gewisser Frauenkrankheiten empfohlen.

III.

Damit schließlich auch das Bildnis als anschaulichster Reflex des kirchlichen Lebens jener Zeit zu Wort kommt, erscheint zunächst die Tatsache bemerkenswert, daß es sich die mittelalterliche Kirche besonders angelegen sein ließ, ihre schützende und fördernde Hand auch über die bildnerische Ausschmückung ihrer liturgischen Bücher zu halten. Zu den frühesten hierhergehörigen Bildurkunden zählt die wertvolle buntfarbige Miniatur in einem Benediktionale des oberösterreichischen Klosters Lambach mit der Darstellung einer priesterlichen Segnung der Wöchnerin und ihres Kindes (Stiftsbibliothek Cod. 73, Bl. 76^{v}; cf. Abb. 1)[12]. Der Geistliche mit dem Ritualbuch in der Linken, begleitet von einem Ministranten mit Weihkessel und Aspergile ist in die Wochenstube eingetreten. Auf ihrem Lager ruht halbaufgerichtet die Wöchnerin, die für die Feierlichkeit, dem Zeitbrauch entsprechend, ihr Festtagsgewand angelegt hat: ein gelb gefüttertes Kopftuch, über dem violetten Unterkleid einen roten Mantel und schöne rote Schuhe. Neben ihr liegt in einer niedrigen viereckigen Bettstatt — nicht Wiege — das fest zu einem handlich-bequemen Bündel zusammengeschnürte Neugeborene, das von der auf einem Schemel sitzenden jugendlichen Wärterin bewacht wird. Ohne Frage ist die ganze Szenenschilderung ein persönliches Erinnerungsbild des Lambacher »Haymo presbyter«, der sich in seinem architektonischen Entwurf offensichtlich an rein romanische Formen hielt. Sie bezeugt uns den zumal in Deutschland bis in die Mitte des 19. Jahrhunderts hinein herrschenden frommen Brauch, vor allem auch das Wochenbett vom Priester segnen zu lassen, um nach uraltem Volksglauben die »bösen Geister« fernzuhalten, von denen die Lambacher Segensformel, »ad mulierem benedicendam post partum« bezeichnenderweise spricht. Der besondere Wert dieses kulturvollen Zeitbildes liegt sicherlich nicht in dem künstlerischen

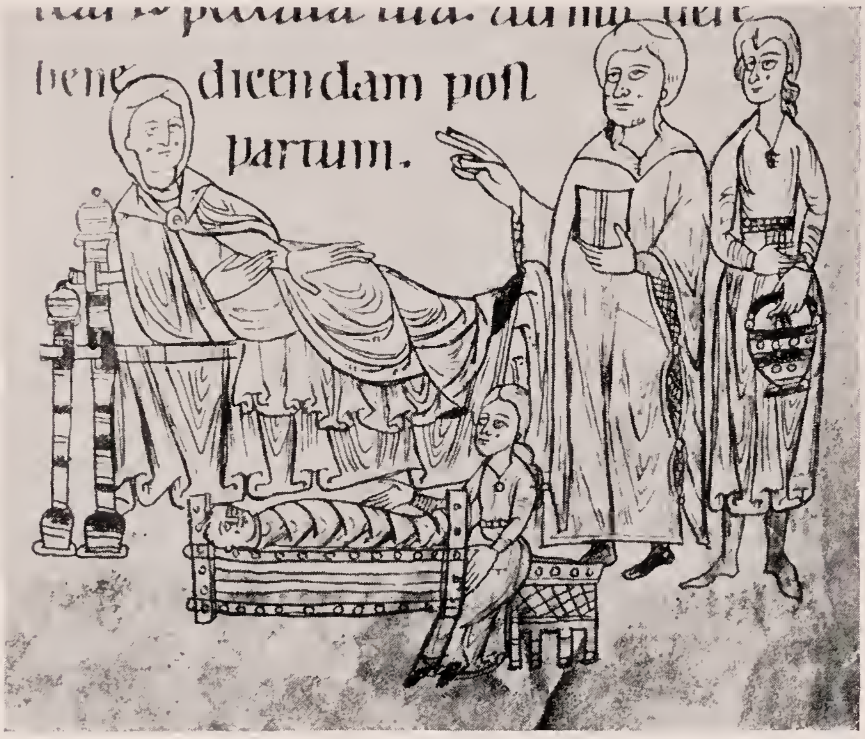
bene dicendam post partum.

Abb. 1. Priesterliche Segnung des Wochenbettes. Buntfarbige Miniatur im Lambacher Ritualbuch, Cod. 73, zwölftes Jahrhundert

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[12] Der Bildschmuck des Lambacher Ritualbuches, das zu den interessantesten Bilderhandschriften des 12. Jahrhunderts zählt, zeigt außerdem auf Blatt 77^{v}. den feierlichen ersten Kirchgang der Wöchnerin mit einer Kerze in der Hand, die sogenannte »Aussegnung« oder »Aufsegnung«. Ein frommer Brauch, der mit dem kirchlichen Fest »Mariä Lichtmeß« zusammenhängt und bereits zu Otfrieds Zeit (9. Jahrhundert) in der deutschen Kirche nachweisbar ist. Hierher gehört auch das wertvolle Gemälde des älteren Brueghel (1530—1569); siehe R. Müllerheim, Die Wochenstube in der Kunst, Abb. 109 (Aussegnung des Wochenbetts).

Gehalt, sondern in der Eigenart und Seltenheit der Darstellung. — Es ist ja leicht begreiflich, weshalb wir in Schriftwerken vergangener Zeiten nur selten auf Illustrierungen treffen, die hier als weitere wichtige Belegstücke beigefügt werden könnten. Denn genau so wie heutzutage, hielt man es bestimmt auch schon ehedem für unschicklich, daß ein Geistlicher in der kritischen Stunde am Bett der Frau verweilt. Immerhin liegen uns aus späterer Zeit — hauptsächlichst bei Kaiserschnittdarstellungen[13] — einige Bildbeispiele in Miniaturen, illustrierten Weltchroniken, geburtshilflichen Schriften usw. vor, in denen zweifellos wahrheitsgetreu die Anwesenheit eines Geistlichen veranschaulicht wird. Bei dem geburtshilflichen Schaubild in Chr. Völters »Neu eröffnete Hebammen-Schuhl«, Stuttgart 1687 (Abb. 2) handelt es sich offenbar um eine schwerere Komplikation im Verlauf der Geburt, mit der die Hebamme allein nicht fertig wird. Der Arzt muß hier persönlich eingreifen: in knieender Stellung bemüht er sich um die Kreißende und seine Hände arbeiten, den damaligen Sitten entsprechend, im Dunkeln unter der Decke des Geburtsbettes. Der zum Seelentrost herbeigerufene Geistliche steht bezeichnenderweise etwas abseits hinter einem Vorhang des reich ausgestatteten Himmelbettes und verliest hier seine Segensgebete für einen glücklichen Ausgang der schweren Geburtsstunde. Unwillkürlich erinnert man sich angesichts derartiger Illustrierungen aus vergangenen Jahrhunderten an tragische Ereignisse unserer Tage, zumal draußen

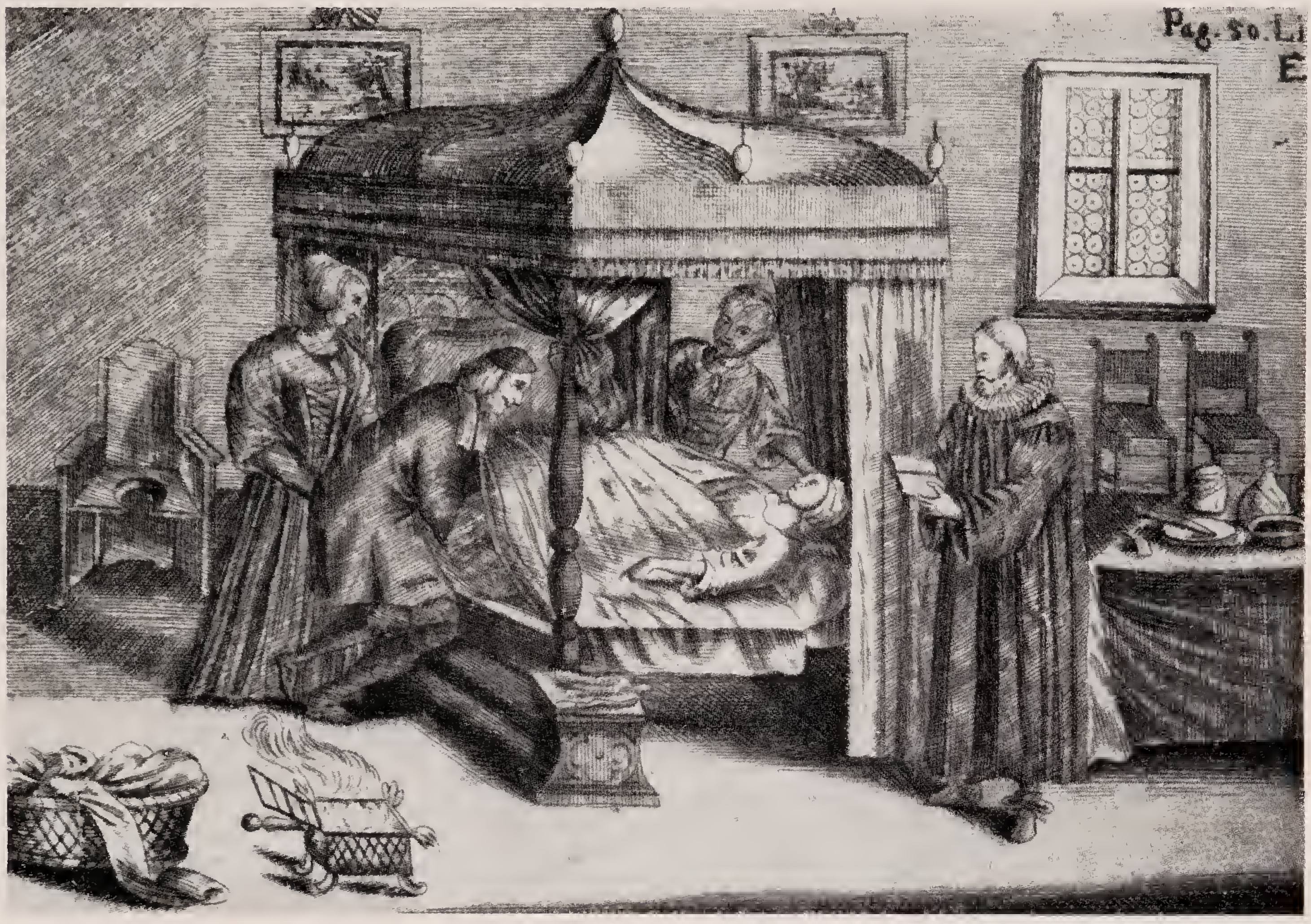

Abb. 2. Arzt und Priester im Geburtszimmer.
Abbildung aus Christoph Völters »Neu eröffnete Hebammen-Schuhl«, Stuttgart 1687

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[13] Den priesterlichen Beistand zeigt z. B. die Kaiserschnittdarstellung in Joann. Scultetus, Armamentarium chirurgic. bipartitum, Francoforte 1666; mit kleinen Abänderungen auch Christoph Völters, Neu eröffnete Hebammen-Schuhl, Stuttgart 1679.

in der Landpraxis, wo man gelegentlich, zu spät gerufen, bereits die Geistlichkeit am Geburtsbett antrifft.

Recht besehen, münden eigentlich alle unsere Ausführungen in die gegenwärtige Zeit. Es wird jedenfalls notwendig sein, in uns immer wieder »Mittelalter« zu schaffen, dem wir besonders auch in geburtshilflicher Beziehung viele neue und wertvolle Anregungen zu verdanken haben. Im Zurückschauen tritt uns gleichsam wie in einem Spiegel der Wirklichkeit das geschichtliche Werden unserer altehrwürdigen Disziplin deutlich vor Augen, klären sich die eigenartigen Heilgebräuche und Anschauungen des mittelalterlichen Volkes, die zum großen Teil bis auf den heutigen Tag lebendig sind. Das bekannte Wort behält dann seine volle Geltung, daß alte vergessene Wahrheiten wieder ans Licht bringen, ebensoviel wert ist, als ganz neue entdecken.

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Geschichte der Medizin

Ein Bildbericht über die älteste öffentliche Krankenanstalt, die „Basilias“.

Mit 2 Originaldarstellungen im Text

Von Dr. Friedrich Weindler, München

Bis in die Gegenwart hat sich bekanntlich eine ganze Reihe ehrwürdiger alter Hospitäler in ihrer malerischen Schönheit erhalten; viele von ihnen sind selbst heute noch in Benützung. Zwar wurden ihre interessanten, Jahrhunderte alten Bauanlagen im Vorwärtsschreiten der Zeit ständig erweitert und umgestaltet. Allein sie können noch immer lebendig erzählen von Cholera, Pest, Lepra und anderen schweren Epidemien, die während des Mittelalters in ihren Mauern ungezählte Opfer an Menschenleben forderten. Anderseits aber auch wahrheitsgetreu berichten von der zwar langsam, aber doch ständig vorwärtsdrängenden Entwicklung auf allen Gebieten des Krankenhaus- und Krankenpflegewesens, nicht zuletzt von den praktischen Fortschritten der allgemeinen Gesundheitspflege. Die ältesten wirklichen Hospitäler des Abendlandes finden sich bekanntlich in Italien. Der schönste und glänzendste Krankenhausbau der Kunstgeschichte ist jedenfalls das Ospedale maggiore in Mailand und ebenso großzügig in der Anlage das bereits 1277 gegründete Ospedale del Ceppo in Pistoia mit seiner ausdrucksvollen Säulenhalle und dem medizingeschichtlich wichtigen Fayencefries aus der Schule della Robbia, der in einer figurenreichen Szene symbolisch die innere Medizin und Chirurgie verherrlicht.[1]) In unseren Tagen trifft man überraschenderweise noch aus der Zeit Innozenz III. (1198 bis 1216) viele Heiliggeistspitäler, entstanden nach dem Vorbild in Montpellier und dann in Rom (S. Spirito in Sassia, 8. Jahrh.); sie sind zumeist der werktätigen Frömmigkeit des Bürgertums zu verdanken. Ergänzend muß vor allem aber auch auf die zahlreichen und wertvollen Hospitaldarstellungen in illustrierten alten Chroniken und Lehrbüchern hingewiesen werden, insbesondere auf die von Künstlerhand geschaffenen Holzschnitte, Kupferstiche, Handschriftenminiaturen etc., die gleichfalls in medizin-kulturgeschichtlicher Hinsicht vermehrte Beachtung verdienen. So beispielsweise der wichtige Kupferstich mit den ehemaligen Bauanlagen der bereits 1225 zu Konstanz von zwei frommen Bürgern gestifteten Heiliggeist-Spitals (Merian 1733), des berühmten im 16. Jahrhundert gegründeten Juliusspitals in Würzburg (Merian 1642). Und besonders aufschlußreich der „Prospect des für alle Kranken und Gebährenden gewidmeten Neuen Allgemeinen Spitals in Wien“ vom Jahre 1784, der die damaligen großzügigen Bauanlagen des berühmten Wiener Allgemeinen Krankenhauses klar vor Augen führt. Man sieht in rechtwinkeliger Anordnung den zweistöckigen, langgestreckten Hauptbau mit Seitenflügel (nach dem Bautyp des Korridorspitals) mit einem Einblick in die großen, freien Gartenanlagen und, isoliert im Hintergrund stehend, den runden, fünfstöckigen „Narrenturm“, das damalige Irrenhaus. Wie mehrere zeitgenössische Verbildlichungen aufzeigen, fand das Wiener Allgemeine Krankenhaus, das bekanntlich bereits im 18. Jahrhundert durch die ärztliche Kunst eines van Swieten, de Haën, Stoll, und dann später durch Rokitansky, Skoda u. a. m. zu hohem Ansehen und Ruhm gelangte, nach innerer Anlage und Organisation mehrfache Nachbildung, und zwar in München und Hamburg zu Beginn des 19. Jahrhunderts. Es kann gewiß nicht in Abrede gestellt werden, daß alle diese alten und neueren Kulturdenkmäler und ihre Geschichte jeden medizin-kulturgeschichtlich interessierten Arzt immer wieder fesseln müssen! Das gilt in besonderem Maße für ein über tausend Jahre altes Miniaturbild mit der Darstellung des ältesten öffentlichen Krankenhospitals aus dem vierten nachchristlichen Jahrhundert, das bisher völlig unbekannt geblieben ist. In der genannten Zeit entstanden zumeist unter dem Patronat frommer Bischöfe als sichtbarer Ausdruck christlicher opferbereiter Nächstenliebe die ersten byzantinischen Unterkunfts- und Verpflegungsstätten für Kranke aller Art. Krankenhausähnliche Hospitalgründungen, in denen aber doch schon der moderne Gedanke eines „Krankenhauses“ in engerem Sinne lebendig wurde. An der Spitze steht die um 370 n. Chr. von dem großen Kappadokier und Bischof von Kaisareia Basileios (329 bis 379) vor den Toren dieser Stadt errichtete „Basilias“, die in ihrem Ausmaße einer kleinen Stadt glich. Tatsächlich eine ganze Kolonie mit Fremdenherbergen,

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[1]) Zu den berühmtesten Spitalbauten zählt fernerhin das 832 gegründete Hospital Santa Maria della Scala in Siena, das bereits 504 von König Childebert I. gegründete Hôtel-Dieu in Lyon. In seiner Außenarchitektur bis heutigentags unverändert geblieben ist das 660 vom hl. Landry gegründete Hôtel-Dieu in Paris, eine Art nationalen Heiligtums der Franzosen. Schließlich die beiden ältesten Londoner Krankenhausbauten, aus dem Mittelalter stammend, das St.-Thomas-Hospital und das 1123 gegründete St.-Bartholomew-Hospital, im Volksmund „Bart’s“ genannt.

Armen- und Altersasylen, eigentlichen Krankenhäusern nebst den nötigen Ärzten, Krankenpflegern und besonderen Krankenaufsuchern (den sogenannten Parabalanen), die zum ersten Male von Basileios verwendet wurden (cf. Basil., Epist. 94) und heute zum Beispiel im St.-Gotthard-Hospiz wieder anzutreffen sind. Eine bildliche Wiedergabe dieser „Basilias“ findet sich nur ein einziges Mal in der darstellenden Kunst! Es ist ein Miniaturbild (Abb. 1) in der zwischen 880 und 886 zu Konstantinopel für den ersten makedonischen Kaiser Basileios (867 bis 886) und dessen Gattin Eudokia verfertigten und mit Vollbildern von erlesener Pracht reichgeschmückten griechischen Handschrift der Homilien Gregoros’ von Nazianos (Fol. 149).[2]) Seit altbyzantinischer

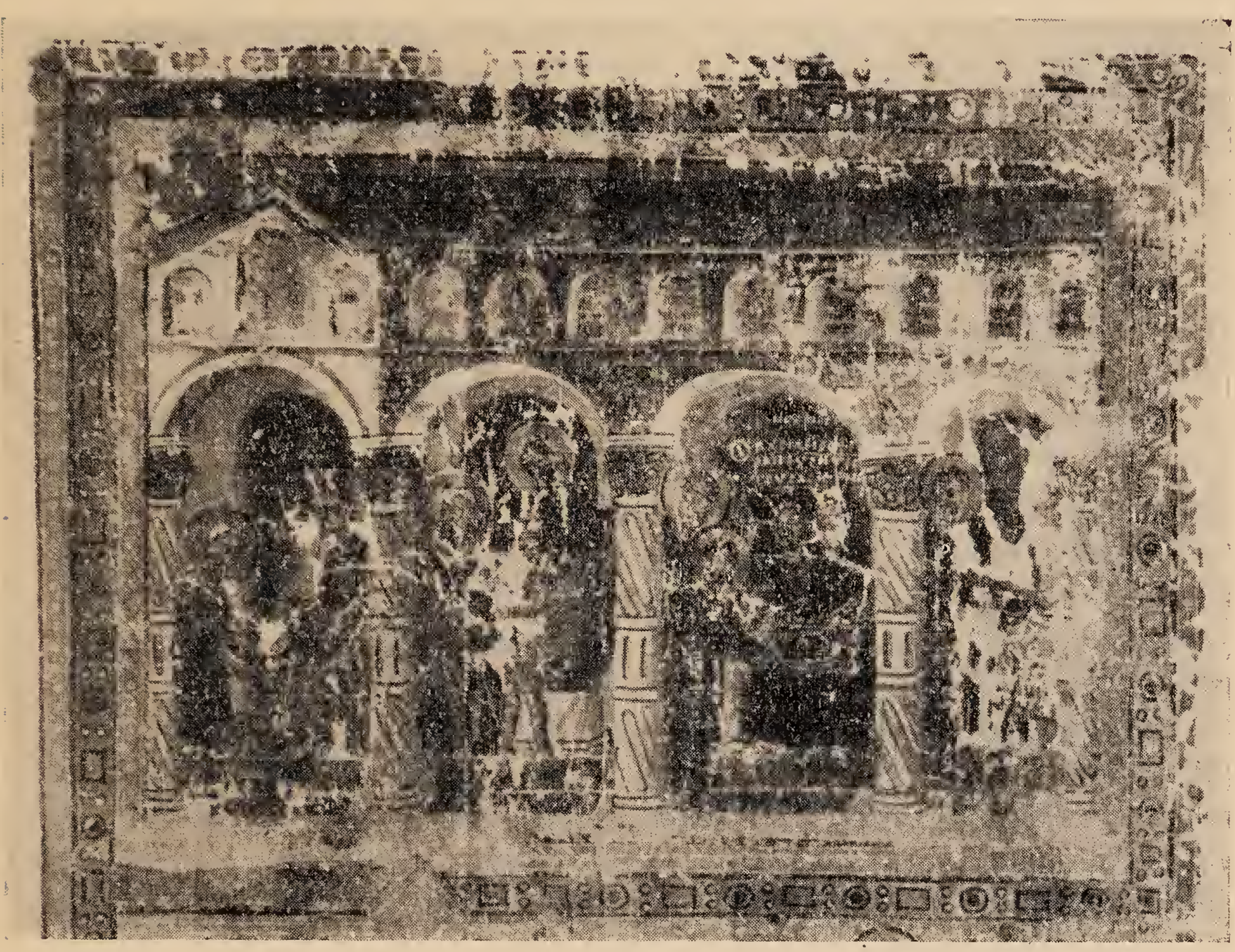

Abb. 1. Vorderansicht der „Basilias“. Handschriftenminiatur des 9. Jahrhunderts.

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[2]) Dieser einzigartige Prachtkodex mit den Homilien Gregoros’ (Pariser Nat.-Bibl., Ms. grec. 510) kam im 15. Jahrhundert wahrscheinlich durch Johannes Laskaris nach Italien in den Besitz eines Medici und endlich nach mannigfachen Schicksalen 1594 in die Königliche Bibliothek nach Paris, die heutige National-Bibliothek.

Zeit das beliebteste und am meisten gelesene Predigtbuch der griechischen Christenheit. An den Anfang der 14. Predigt Gregoros' „De pauperum amore" stellt der unbekannte byzantinische Buchkünstler des 9. Jahrhunderts sein Hospitalbild — offenbar begeistert von der glänzenden Kanzelrede des berühmten Kirchenlehrers, die in wunderbarer Sprachgewandtheit und christlicher Gedankenpoesie eingehend Bezug nimmt auf das gewaltige und vorbildliche humanitäre Institut seines Freundes Basileios: „Geh hinaus vor die Stadt Kaisareia, dort siehst du ein größeres Wunderwerk als es die Weltwunder des Altertums waren. Dort sammelt Basileios alle, selbst mit den entsetzlichsten Krankheiten, er liebt sie wie Brüder, küßt ihre Wunden, pflegt sie" usw. Diese Verherrlichung der barmherzigen Stiftung weiß der kunstfertige Miniator eindrucksvoll ins Bildhafte zu übertragen. In anlehnung an frühere, ihm bekannte Bauschöpfungen faßt er die ausgedehnten Hospitalanlagen vor Kaisareia in einen einzigen monumentalen Krankenhausbau zusammen — in Wirklichkeit ein wahres Prachtbauwerk mit seiner imponierenden palastartigen Vorderfront![3]) Fünf mächtige und reichornamentierte Hauptsäulen in bläulicher Bemalung und mit vergoldeten Kapitälen steigen frei empor, durch kräftige Rundbogen miteinander verbunden. Über ihnen in harmonischer Gliederung ein rosafarbenes Stockwerk mit einer langen Fensterlinie und schmalen gürtenden Zwischensimsen. Das Ganze überragt von einer in Grau gehaltenen, waagerecht verlaufenden Balkendecke. Der unmittelbar ins Freie führende und von der Sonne geschützte prächtige Arkadengang vermittelt nach rückwärts eine Durchsicht nach den Innenräumen des Hospitals. Und hier in der geräumigen Vorhalle spielen sich einige medizingeschichtlich sehr wichtige Einzelszenen ab. Zwar sind die Farben derselben leider stark ausgesprungen und auch die griechische Inschrift (mit Unzialbuchstaben) im dritten Säulenzwischenraum deutet nur kurz darauf hin, daß hier die beiden heiliggesprochenen Gregorios und Basileios „Kranke pflegen".[4] Bei näherem Zusehen erkennt man aber sofort, daß hier in der Vorhalle des Hospitals an einigen neuaufzunehmenden Personen die vorgeschriebene Säuberung ihrer Füße und Hände vorgenommen wird. Hierzu hat sich der Heilige im äußeren linken Arkadenbogen eigens die Ärmel seines Gewandes hoch hinaufgeschlagen. Diese nach unseren Begriffen freilich noch recht unzureichende Reinigungsmaßnahme bei der Aufnahme wird in unserem über tausend Jahre alten Miniaturbild zum ersten Male veranschaulicht/ um dann in späteren Hospitaldarstellungen (auch mit der Kopfwäsche) des öfteren wiederholt zu werden. Die vier aufschlußreichen Einzelszenen sind natürlich mit bestimmter Absicht vom Buchkünstler eingezeichnet worden. Sie beweisen einerseits, welchen Wert man in den frühesten Pflege- und Versorgungsanstalten tatsächlich auf die Säuberung der Neuaufzunehmenden legte, sie sollen anderseits aber auch mit aller Deutlichkeit zum Ausdruck bringen, daß sich selbst die beiden hohen Kirchenfürsten nicht scheuten, eigenhändig an den Neuankömmlingen die Säuberungshandlung vorzunehmen, die man in unseren Tagen dem Pflegepersonal überläßt. Im übrigen dürfte der monumentale Prachthospitalbau, den das Miniaturbild aufzeigt, wohl kaum den wirklichen Bauanlagen der „Basilias" entsprechen, die mit ihren einzelnen Häusergruppen sicherlich viel einfachere Verhältnisse aufwiesen. Möglich immerhin, daß vielleicht das Hauptgebäude dieser umfangreichen Siedlung eine reichere Außenarchitektur besaß. Was der kunstsinnige byzantinische Miniator anstrebte, war ja offensichtlich, die vielen Leser der Homilien Gregoros' von der Größe und Bedeutung der weltberühmten Krankenpflegestätte vor Kaisareia sinnfällig zu überzeugen. Darüber hinaus ihren Begründer zu verherrlichen, der, selbst in Dürftigkeit lebend, seine reichen Einkünfte zumeist seinem humanitären Institut zuwandte. Von dem Geist, der hier bereits im 4. Jahrhundert unter dem Patronat des großen Menschenfreundes Basileios[5] herrschte, sollten ausdrücklich die vier Einzelszenen in den Arkadenbögen Zeugnis ablegen. Das Hospitalbild wird also unter den Händen des Künstlermalers zu einem verpflichtenden Symbol allgemeiner christlicher Humanität, die bekanntlich dem ganzen Mittelalter Antlitz und typische Prägung verlieh. Wie bereits erwähnt, wurden in diesen frühesten Pflege- und Zufluchtsstätten der Barmherzigkeit, wie in der „Basilias“, nicht allein gesunde Obdachlose, durch Alter und Elend geschwächte Hilfsbedürftige, sondern hauptsächlichst Kranke aller Art und zu jeder Zeit aufgenommen. Dabei ist als besonders wichtig hervorzuheben, daß schon Basileios in kluger Erkenntnis der Gefahren einer direkten Übertragung, für Aussätzige eigene Isolierhäuser in seiner Krankenkolonie errichtet hatte, in denen diese Elenden für sich allein gepflegt werden konnten. Interessanterweise führt nun ein anderer Buchkünstler der gleichen Pariser Handschrift mit den Homilien Gregoros' auf Fol. 170 (Abb. 2) einige charakteristische Krankentypen der

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[3]) Die großartige Außenfront zeigt eine auffallende Ähnlichkeit mit späteren italienischen Hospitalbauten, so zum Beispiel mit dem oben erwähnten Ospedale del Ceppo in Pistoia, dem prunkvollen Ospedale maggiore in Mailand, dem monumentalen Hospital von Santo Maria Nuova in Florenz von 1388. Auch der Mosaikschmuck in der Normannenkirche zu Monreale oberhalb Palermos (1182) mit der Darstellung eines Krankenhauses erinnert an unser Hospitalbild (vgl. Fig. 92, E. Holländer, Die Medizin in der klassischen Malerei). Schließlich ist hier noch auf eine Miniatur im Ashburnham-Pentateuch (7. Jahrh., Paris, Nat.-Bibl., Nouv. acq. lat. 2334, Fol. 22 b) hinzuweisen; sie zeigt eine medizingeschichtlich überaus wichtige Geburtsszene (Zwillingsgeburt der Rebekka), und zwar in der Vorhalle eines stattlichen, basilikaförmigen Gebäudes.

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[4] Die griechische Inschrift lautet: ΟΑ[ΓΙΟϹ] ΓΡΗΓΟΡΙΟϹ Κ[ΑΙ] Ο Α[ΓΙΟϹ[ΒΑϹΙΛΕΙΟϹ ΘΕΡΑΠΕΥΟΝΤΕϹ ΤΟΥϹ ΑϹΘΕΝΕΙϹ = „Ὁ ἅγιος Γρηγόριος καὶ ὁ ἅγιος Βασιλεῖος θεραπεύοντες τούς ἀσθενεῖς". — Die beiden Heiligen erscheinen in langen braunen Gewändern, die überdeckt werden von kürzeren purpurfarbenen Schultermäntel und über ihren Häuptern die mächtigen goldenen Heiligenscheine.

[5] Es ist besonders hervorzuheben, daß dieser klassisch gebildete Kirchenlehrer über die damaligen Probleme der ärztlichen Kunst und der Naturwissenschaften bis ins Kleinste unterrichtet war. Dafür spricht unter anderem die fünfte seiner Predigten über das sechstägige Schöpfungswerk „Hexahemeros".

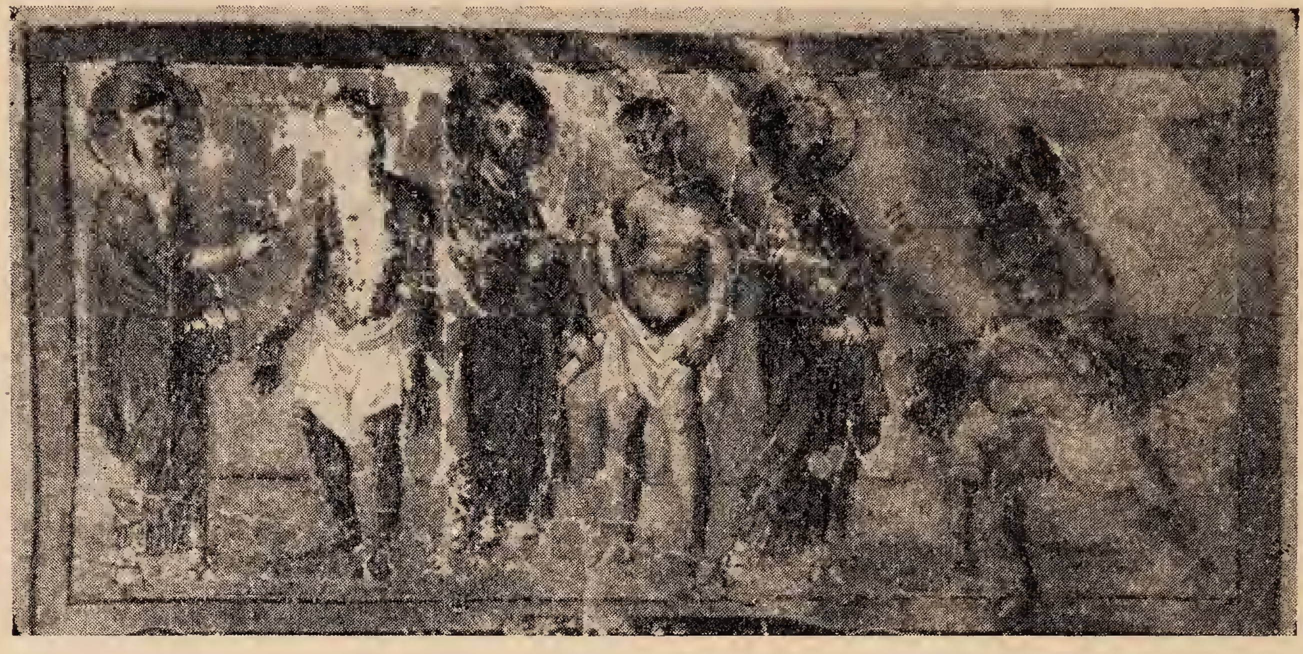

Abb. 2. Krankenbildnisse. Handschriftenminiatur des 9. Jahrhunderts.

damaligen Zeit anschaulichst vor Augen. An erster Stelle natürlich den Leprösen — bis auf einen bläulich bemalten Leibschurz völlig nackt, so daß man den mit lauter unbestimmten dunkleren Tupfen übersäten Körper genügend mustern kann. Eine medizinpathologisch vollkommen wertlose Porträtierung, die sich ältester traditioneller Bildberichtung anschließt. Auch der ebenso notdürftig bekleidete Wassersüchtige, der lediglich die Anfänge der aszitischen Auftreibung seines Leibes erkennen läßt, ist nur eine schablonenhafte Nachbildung frühester Vorlagen (siehe die Katakombenmalereien der ersten christlichen Jahrhunderte). Dabei trifft man bereits in der gleichen Zeit der Entstehung unserer Handschrift die wertvollsten, dem wirklichen Leben mit erstaunlicher Realistik nachgezeichnete Krankenbildnisse, zum Beispiel in den kirchlichen Wandmalereien Reichenauer Klosterkünstler des 9. Jahrhunderts.[6]) Dramatisch bewegter hingegen und naturgetreuer sind die Krankheitsschilderungen der beiden „dämonisch Besessenen“, die, dem biblischen Bericht entsprechend, mit schweren Eisenketten an Händen und Füßen gefesselt, veranschaulicht werden. Sie kommen von zwei im Hintergrund stehenden antikisierenden Grabstätten, in deren Nähe sich bekanntlich diese hysterischen und exaltierten Religionsfanatiker, vom „unsauberen Geist“ getrieben, mit Vorliebe aufhielten.

Alles zusammengenommen kann es nicht zweifelhaft sein, daß das bisher unbekannte und daher eingehender gewürdigte Hospitalbild aus byzantinischer Zeit in medizin-kulturgeschichtlicher Beziehung besondere Beachtung verdient. Es trägt das Gepräge seiner Zeit und gewinnt damit für die Geschichte des Hospitalbauwesens vermehrte Bedeutung. Die treibende Kraft der helfenden Nächstenliebe führte zur Schöpfung dieser großangelegten Pflege- und Bewahrungsstätte vor Kaisareia, und was hierbei ganz besonders hervorgehoben zu werden verdient, sie war der uneigennützigen und selbstlosen Privatwohltätigkeit eines einzelnen frommen Mannes zu verdanken. Und wichtig genug: seit Gründung der „Basilias“ vergingen nahezu anderthalb Jahrtausende, bis sich als Auswirkung der bedeutenden wissenschaftlichen und praktischen Fortschritte der Medizin aus den ursprünglichen Pflegehospitälern wirkliche Heilanstalten, das heißt, „Krankenhäuser“ in unserem Sinn entwickelten, die tatsächlich heute auch wieder — gleich der „Basilias“ — als wahre Krankenstädte zu bezeichnen sind.

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[6]) Vgl. Friedrich Weindler, Volksmedizin in den Wandmalereien des deutschen Mittelalters. Sudhoffs Archiv f. Geschichte der Medizin und der Naturwissenschaften, Bd. 30, Heft 1 u. 2, 1937.

Gesellschaftsbuchdruckerei Brüder Hollinek, Wien, III., Steingasse 25.

Sonderdruck aus der Münchener Medizinischen Wochenschrift
1938, Nr. 22, S. 838.
J. F. Lehmanns Verlag, München 15.

Zur Bildnisfrage des Hippokrates.

Mit 5 Originaldarstellungen im Text.

Von Dr. Friedrich Weindler, München.

Hippokrates, ein viel genannter Name! Aber merkwürdig, wie wenig geschichtlich Beglaubigtes noch heute trotz eifriger Forschertätigkeit über seine Lebensschicksale, über die Echtheit der seit Jahrtausenden mit seinem Namen verknüpften Schriftensammlung und nicht zuletzt über die leibliche Erscheinung des Koer Arztgelehrten bekannt ist, der uns bis in die letzte Gegenwart leuchtendes Vorbild und Führer geblieben ist. Es bedarf gewiß keiner näheren Begründung, daß gerade die Frage nach dem Aussehen des Aerzteheros jeden beruflichen Nachfahren in ganz besonderer Weise angeht. Sie wird sich, um das gleich vorauszuschicken, mindestens bis dahin sicher beantworten lassen, wie Hippokrates nicht ausgesehen hat! Es fehlen uns begreiflicherweise Vergleichsmöglichkeiten mit dem Original, die unzweifelhaft die einzig gesicherten Resultate ergeben und für alle Zeiten uneingeschränkte Gültigkeit besitzen würden. Nur ein Porträtkünstler, der Hippokrates persönlich gekannt hätte, wäre tatsächlich imstande gewesen, die authentische Erscheinung des Mannes wieder erstehen zu lassen. Zum Wesen des Bildnisses gehört nun einmal die absolute Aehnlichkeit, d. h. die charakteristischen Gesichtsmerkmale der darzustellenden Person mit gegenständlicher Treue zu vergegenwärtigen. Aber gerade diese Verpflichtung des Bildnisses, unbedingte Aehnlichkeit zu gewährleisten, erfüllen nur zum Teil alle jene mehr oder weniger frei behandelten Porträtbüsten, Statuen, Medaillen und späteren graphischen Bildwerke, die nach alter

Ueberlieferung das Antlitz des Hippokrates vorstellen sollen. Bei keinem dieser nicht selten meisterhaft gestalteten Idealporträts ist jedenfalls wirkliche Bildnistreue mit Sicherheit nachzuweisen, wenn sie auch untereinander bei näherem Zusehen vielleicht eine gewisse Aehnlichkeit erkennen lassen. Der eine oder andere charakteristische Gesichtszug mag dabei wohl auch richtig wiedergegeben sein und damit der historischen Wahrheit näherkommen. Hierfür ein paar sinnfällige Bildbeispiele für viele: Die angeblich antike Porträtbüste des Hippokrates, die im 5. Jahrhundert bei Albano gefunden und jetzt im Londoner Britischen Museum aufbewahrt wird. Dann jener wertvolle im Athenischen Nationalmuseum befindliche und nur einmalig vorhandene Porträtkopf, der 1902 in der Grabstätte eines Arztes an der Via sacra zusammen mit einigen chirurgischen Instrumenten aufgefunden wurde. Möglicherweise stellt er das Abbild des Meisters dar; wenigstens sprechen einzelne individuelle Gesichtsmerkmale für diese Vermutung[1]).

Immerhin sind einige Grundzüge des Antlitzes kennzeichnend genug, daß sie als gemeinsame Merkmale in einer größeren Reihe von Bildwerken regelmäßig wiederkehren. So wird übereinstimmend ein Mann im mittleren oder vorgeschrittenen Lebensalter mit vornehmem, edlem Gesichtsausdruck geschildert, dessen ernstes Antlitz überlegene Ruhe, innere Größe und Schlichtheit widerspiegelt. Sein ausdrucksvoller, gewaltiger Kopf mit der imponierenden hochgewölbten Stirn läßt auf tiefes Wissen und hohe Geistesbildung schließen, während die kräftige, gleichgeformte Nase dem Gesicht etwas Energisches, die großen Augen mit ihren dichten Brauen demselben einen gewissen Zug von Nachdenklichkeit verleihen. Schließlich zeigen übereinstimmend die Bildnisse den stattlichen Vollbart mit einem schmalen, nach abwärts gerichteten Schnurrbart und als besondere Alterskennzeichnung das kahle Haupt, das jedoch in späteren Abbildern als Greis gewöhnlich mit einer Kopfbedeckung (ein übergeschlagenes Mantelstück) veranschaulicht wird.

Zur Klärung der Frage nach dem Aussehen des Hippokrates ist vor allem wichtig zu wissen, daß bis heute nur ein einzig sicher beglaubigtes Bildnis desselben in den Berliner Bronzemünzen von Kos aus der Kaiserzeit vorliegt. Das geschichtlich allein gültige Abbild des bedeutendsten Sohnes der Insel ist für uns so wertvoll, daß wir es in vergrößerter Originalnachbildung hier beifügen (Abb. 1). Wir werden uns jedenfalls immer wieder dies alte koische Münzbild vor Augen halten müssen, um eine bestimmte Vorstellung von den Gesichtszügen des großen Lehrmeisters zu bekommen. Es zeigt auf der einen Seite den Kopf des Hippokrates mit den zwei Anfangsbuchstaben seines Namens *I Π*, auf der anderen den Schlangenstab des Asklepios, bzw. den Namen des Jugurtha, eines damaligen Beherrschers der Insel Kos. Ganz offensichtlich haben sich die kunstfertigen koischen Münzmeister alle Mühe gegeben zum Andenken an ihren berühmten und unendlich gefeierten Mitbürger ein möglichst ähnliches Bildnis der Nachwelt zu überliefern, die ganze geistige Wesenheit dieses gelehrten und klugen Arztes zu erfassen und darzustellen. Dabei darf vielleicht kurz noch daran erinnert werden, daß sich sein Andenken im Volke fortlebend bis zum heutigen Tag auf seiner Heimatinsel erhalten hat, indem man ihn hier vielfach als einen der zahlreichen Heiligen der katholischen Kirche verehrt. Das dürfte aber wohl auch alles sein, was sich an Erinnerungen an Hippokrates und die einstige Herrlichkeit auf Kos mit der von ihm organisierten hochberühmten ärztlichen Lehranstalt bis in die Gegenwart noch erhalten hat.

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[1]) Diese beiden angeblichen Hippokrates-Bildnisse sind wiederholt veröffentlicht worden; außer im archäologischen Schrifttum bei E. Holländer, Plastik und Medizin, Stuttgart 1912, Abb. 388 u. 389 und in der „Geschichte der Medizin im Ueberblick“ von Th. Meyer-Steineg und K. Sudhoff, Jena 1922, Abb. 36 und 37.

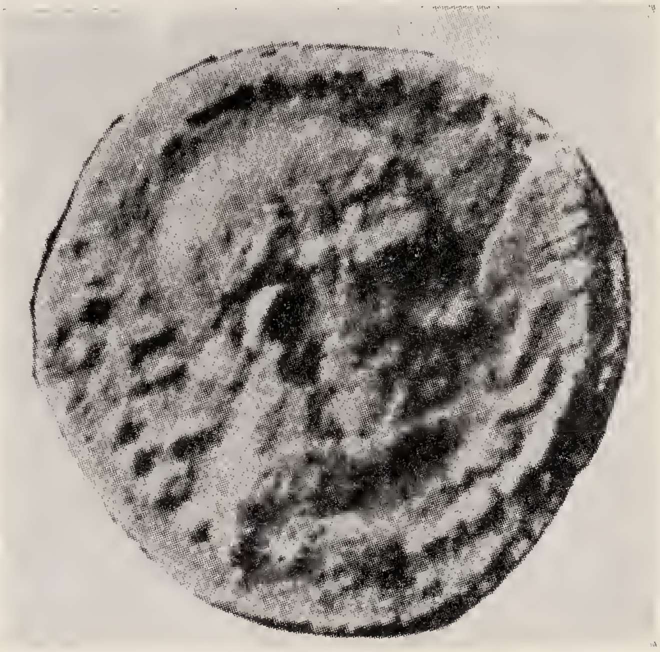
Abb. 1. Münzenbild von Kos aus der Kaiserzeit.

Ein aufschlußreiches Kapitel für sich bilden die Hippokrates-Darstellungen in mittelalterlichen Bilderhandschriften, die eine eingehendere Würdigung bisher noch nicht gefunden haben. Sie stehen bemerkenswerterweise samt und sonders ganz für sich allein im Kreise altüberlieferter Bildwerke! Lediglich als Buchschmuck zur Belebung des Textes gedacht und dem in damaliger Zeit stark verbreiteten

Anschauungs- und Unterhaltungsbedürfnis des Lesers dienend, kann keine einzige Anspruch auf getreue Porträtähnlichkeit des Abgebildeten erheben. Sie sind in der Tat nur zum Beweis dafür heranzuziehen, wie Hippokrates bestimmt nicht ausgesehen hat! Nicht etwa aus technischem Unvermögen, sondern tatsächlich nur aus lauter Bequemlichkeit und andauernder Gleichgültigkeit nahmen sich die unbekümmerten mittelalterlichen Buchillustratoren gar nicht erst die Mühe, ein möglichst ähnliches Abbild des Koers klar vor Augen zu stellen. Sie, die doch sonst so zäh am Ueberkommenen festhielten, dachten bei ihren Porträtierungsversuchen bezeichnenderweise nie daran, gerade hier auf die bildkünstlerische Ueberlieferung zurückzugreifen. Ihre vollkommen nach freiem Gutdünken hingemalten und daher stets anders aussehenden Fantasiebildnisse, bei denen höchstens dies oder jene charakteristische Gesichtsmerkmal (z. B. die Bärtigkeit oder das kahle Haupt) der Wirklichkeit entsprach, sind also das direkte Gegenteil zu einem individuell erfaßten, lebensnahen Porträt. Sie bestätigen aufs neue die vielfach noch unbekannte Tatsache, wie gering das ganze Mittelalter im allgemeinen die Persönlichkeit bewertete — im offenen Gegensatz zur Renaissance oder der Neuzeit, die jedenfalls mehr Achtung vor dem menschlichen Antlitz hatten. Immerhin dürften allein schon diese frei erfundenen, schemenhaften Hippokratesbildnisse den bilderliebenden Laien in damaliger Zeit vollauf genügt haben. Ihr erhöhtes Augenmerk richtete sich wohl mehr auf das Drum und Dran, die hell leuchtenden buntfarbigen Kostüme, das farbig-vielfältige Beiwerk, kurz die ganze fantasiereiche malerische Ausstattung, die den mittelalterlichen Buchillustratoren hundertmal wichtiger erschien, als die Persönlichkeit selbst. Schon die vorsorglich angebrachten Namensbeischriften, wie „Ipocras“, „Ypokrates“, beweisen deutlich genug, daß sie von der wirklichen Erscheinung des Dargestellten selbst nicht überzeugt waren.

Man vergleiche mit dem sicher beglaubigten Vorbild aus Kos beispielsweise die handwerksmäßig ausgeführte Miniatur in einer wertvollen Wiener Handschrift des 13. Jahrhunderts (Cod. Pal. Vindob. lat. 93, Bl. 2), die zu unserer Verwunderung Hippokrates vorstellen soll (Abb. 2). In dunkelblauem Gewand, darüber ein weinroter Mantel, auf einer reich verzierten Bank sitzend, blickt er mit großen, weitgeöffneten Augen (eine regelmäßig wiederkehrende stilistische Eigentümlichkeit dieser Zeit) auf den vor ihm liegenden Folianten. Lediglich die Aufschrift „Ipokrates“ bezeugt die Absicht des Miniators, die Person des Arztgelehrten zu veranschaulichen. Die Fantasieschöpfung gleicht aufs Haar einer Evangelistendarstellung, wie sie so häufig in frühmittelalterlichen Evangeliarien und karolingischen Handschriften anzutreffen sind. Mehr als auf alles andere legte der unbekümmerte Buchkünstler sein Hauptaugenmerk auf die dekorative Ausstattung des Bildes. Aber selbst die ist mit ihrer altertümlichen Nischenarchitektur, den weinroten Säulen und Blumenvase zwischen 2 Vögeln, den grünen Vorhängen einfach spätantiken Vorlagen nachgezeichnet. —

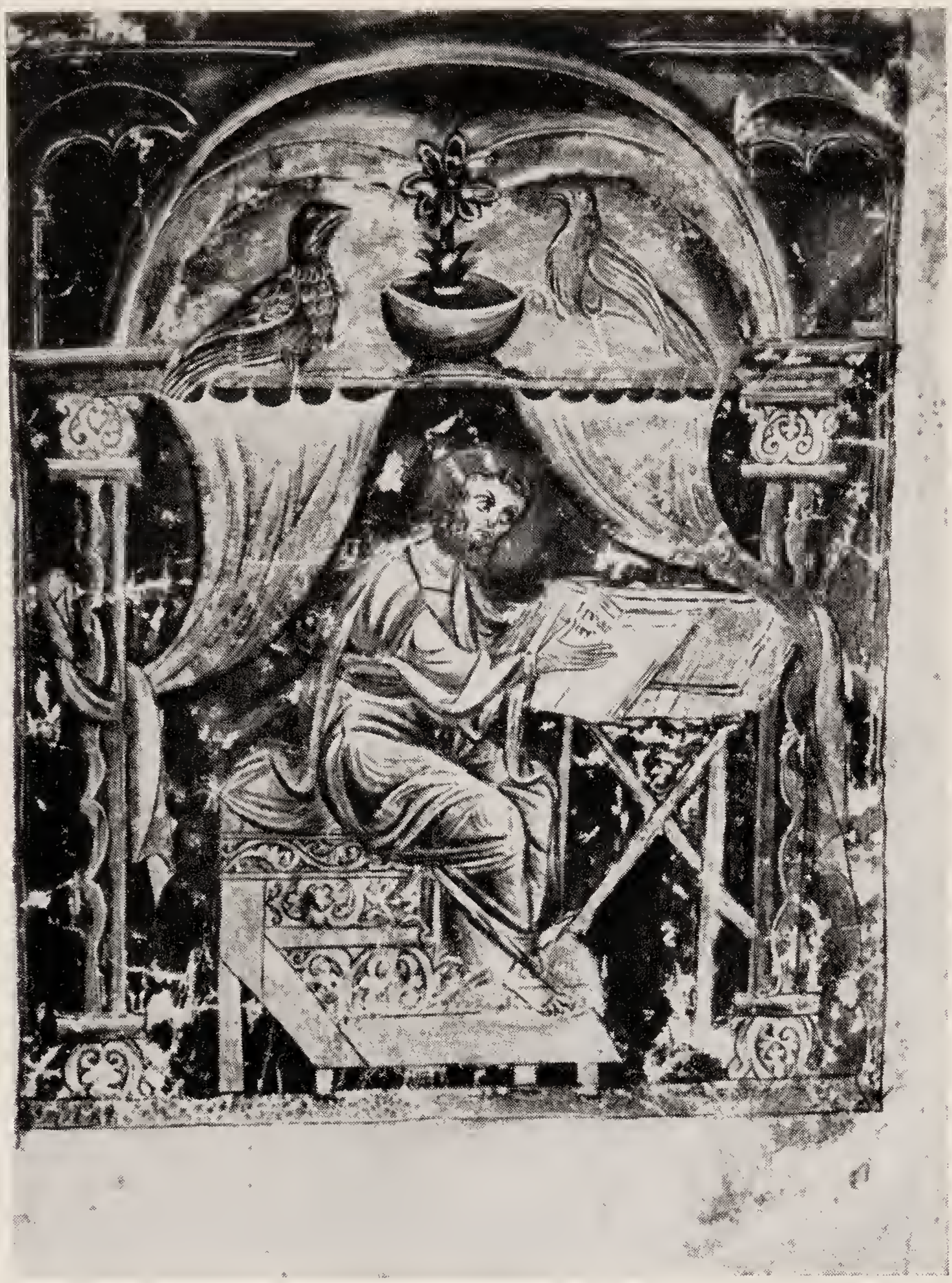

Abb. 2. Miniaturbildnis aus der Wiener Handschrift des 13. Jahrhunderts. Cod. lat. 93, Bl. 2.

In der gleichen Wiener medizinischen Sammelhandschrift des 13. Jahrhunderts (Apuleius, De medicaminibus herbarum liber, Bl. 27v) befindet sich noch ein weiteres aufschlußreiches Miniaturbild, vermutlich von demselben handwerklichen Buchmaler entworfen (Abb. 3). Es zeigt in einer Gruppe vereinigt, die 3 großen medizinischen Forscher des Altertums „Ypokrates", seinen Zeitgenossen „Plato" und „Dioscorides"[2]). Alle drei sitzen mit weit aufgerissenen Augen in einem auf blaugrünen Pfeilern ruhenden, dunkelroten Nischen-

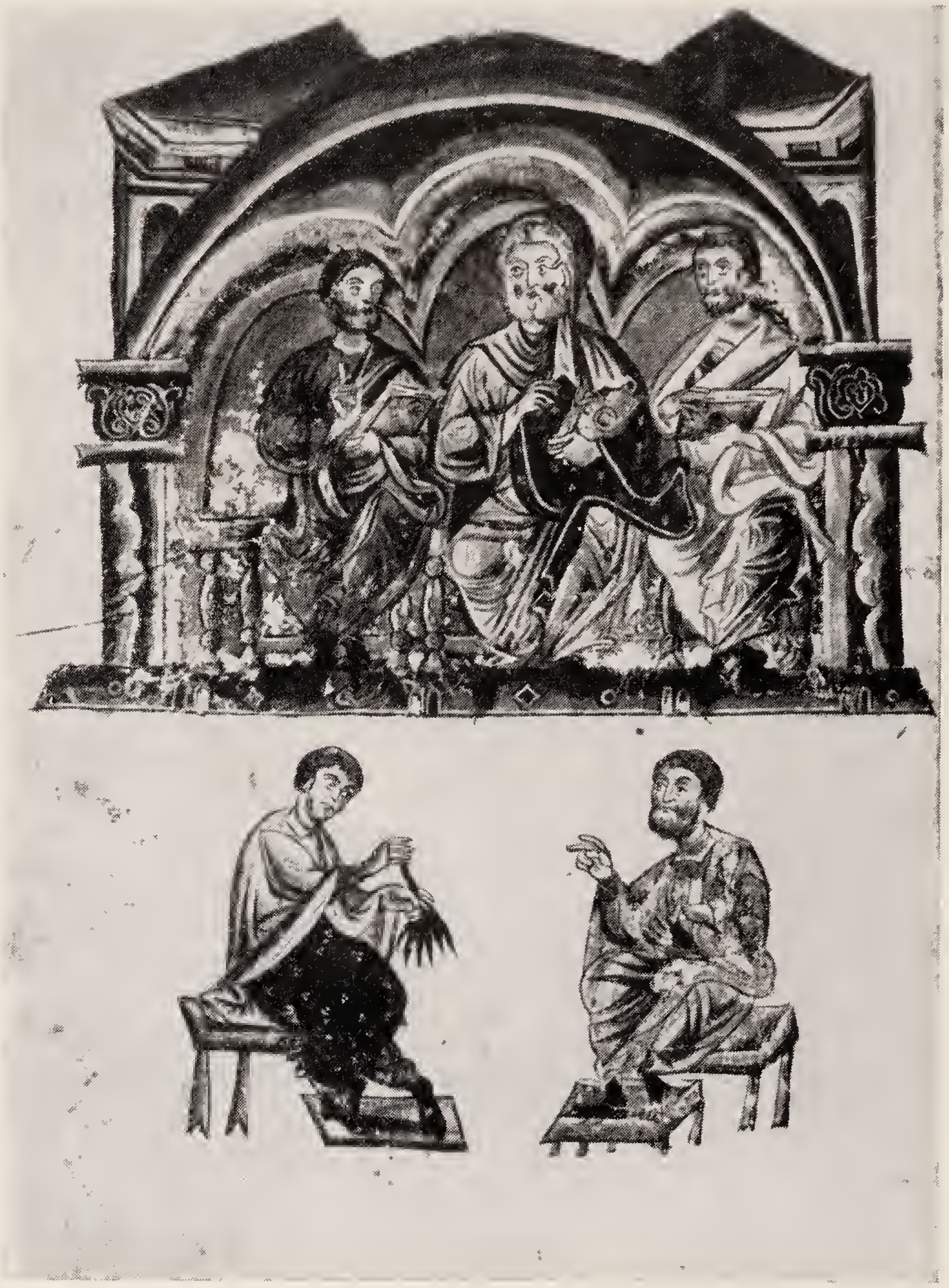

Abb. 3. Aerztliches Gruppenbild aus dem 13. Jahrhundert: Hippokrates, Plato und Dioskurides.

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[2]) Die im Hintergrund des Miniaturbildes gleichsam nur stenografisch angedeuteten Gebäudeformen stellen nach Vermerk in der Handschrift die „Urbs Coa Ypocratis" dar.

bau auf goldenen Bänken und halten Kodizes mit goldenen Einbänden in ihren Händen. Der schematisierende Illustrator trug tatsächlich kein Bedenken, gleich allen drei Dargestellten aus reiner Bequemlichkeit nichtssagende Einheitsgesichter hinzumalen. Wäre im Texteingang der Handschrift nicht ausdrücklich auf „Ypokrates“ hingewiesen, wären fernerhin im Florentiner Kodex der Laurenziana (Cod. XVI, Pl. XXIII) nicht die Namen der dort gleichfalls dargestellten drei Medizingelehrten beigeschrieben — so wüßte man in der Tat nicht, wer eigentlich im konkreten Falle hier gemeint ist! Bei keinem dieser Fantasiegebilde ist auch nicht im entferntesten an eine naturwahre Wiedergabe von Gesicht und Gestalt zu denken; zumal bei der ersten Person zur Linken im braunen Gewand und roten Mantel, mit dunklem kurzem Vollbart und einer Art von Mönchskappe auf dem Kopf, die nach der erwähnten Beischrift Hippokrates sein soll. Ganz offensichtlich geht auch das vorliegende ärztliche Gruppenbild auf spätantike Vorlagen zurück, etwa auf den kostbaren Konstantinopolitaner Dioskurides-Kodex aus dem 1. Viertel des 6. Jahrhunderts mit der bekannten Cheiron und Galengruppe (Wiener Cod. med. graec. I, Bl. 2v — und 3v —). Hierzu und vor allem für den vorliegenden Herbarius des Pseudo-Apuleius paßt auch die botanische Lehrstunde zwischen Meister und Schüler unterhalb der Aerztegruppe.

Die folgende auf Pergament gemalte Miniatur einer medizinischen Sammelhandschrift der Pariser National-Bibliothek vom Jahre 1345 (Ms. grec. Nr. 2144, Bl. 11) zeigt den Koer im Greisenalter (Abb. 4). Schneeweiß sein Haar und der lange Vollbart; die hohe kahle Stirn deckt schützend ein Teil des roten Mantels, unter dem das blaue, mit Edelsteinen umsäumte Gewand hervortritt. In seiner Rechten ein Schreibrohr, während die Linke ein offenes Buch umfaßt, auf dem in roten Großbuchstaben die ersten weltberühmten Worte seiner Aphorismen (I, 1) eingeschrieben sind: „*Ὁ βίος βϱαχὺς, ἡ δὲ τέχνη μαϰϱὴ ὁ δὲ ϰαιϱὸς ὀξύς.*“ Vorsorglich wird aber noch überdies am oberen Bildrande in roten Buchstaben die Inschrift: „*Ὁ Ἱπποϰϱάτης ὁ Κῶος*“ angebracht. Denn auch dieses feierlich-repräsentative Autorenbildnis, das in der Folgezeit wiederholt nachgezeichnet worden ist[3]), zählt trotz einiger individuell scheinender Porträtmerkmale bestimmt nicht zu den authentischen Abbildern des Hippokrates.

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[3]) Am bekanntesten der Titelkupfer mit der unglaubwürdigen Hippokrates-Darstellung in C. Aubry: Hippokrates, Opera omnia, Genf, Chouët 1657.

Zum Abschluß noch ein besonders aufschlußreicher und sinnfälliger Bildbeleg, der geradezu als ein Unikum und als Musterbeispiel dafür zu gelten hat, wie gleichgültig das Mittelalter der persönlichen Erscheinung gegenüberstand, im besonderen wie der Koer Arztgelehrte unmöglich ausgesehen haben kann (Abb. 5). Es ist ein noch heute wohlerhaltenes Freskogemälde als kirchlicher Wandschmuck der Krypta der Cattedrale di S. Maria zu Anagni, entstanden kurz vor 1255. Die greisen „Ipocras“ und „Galienus“ sitzen in reichen, fan-

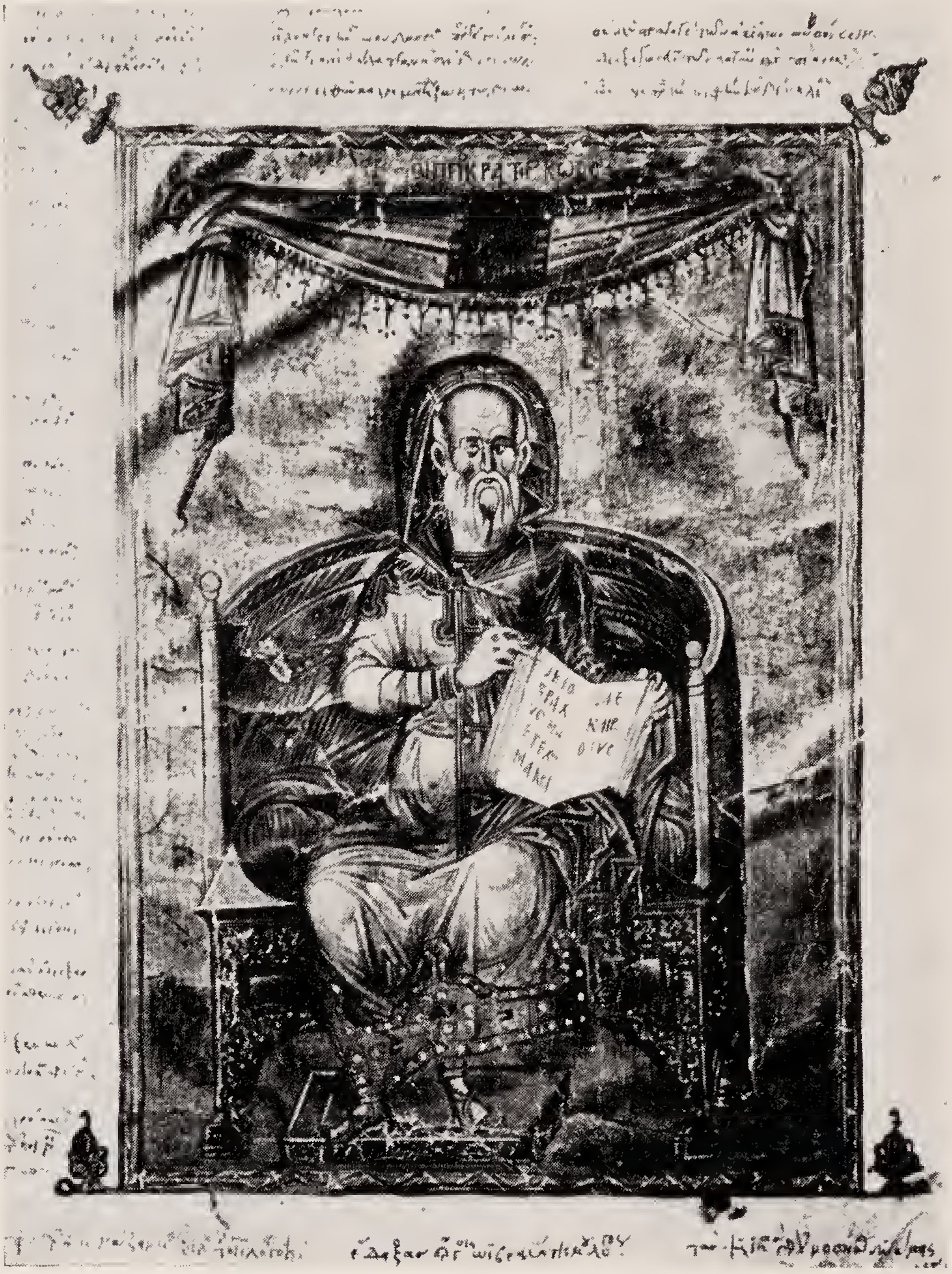

Abb. 4. Hippokrates im Greisenalter. Handschriftenbildnis vom Jahre 1345. (Pariser National-Bibliothek.)

tastischen Gewändern und noch seltsameren Kopfbedeckungen an Tischen einander gegenüber. In ihrem Aussehen mit dem bis auf die Schultern herabreichenden weißen Haupthaar und den langen weißen Vollbärten gleichen sie wie ein Ei dem andern. Jeder hat einen mächtigen Folianten vor sich liegen, und während Hippokrates mit dozierender Geste seine Lehrsätze vorträgt, unterbricht Galen das Nachschreiben, um mit gespanntester Aufmerksamkeit den Worten seines Meisters zuzuhören. Sogar das Vortragsthema wird uns bekanntgegeben: „Mundi praesentis series manet ex elementis. Ex his formantur quae sunt quaecunque creantur“ — also die bekannte Lehrmeinung des Empedokles von den 4 Urstoffen, aus denen sich die ganze Welt zusammensetzt, und die wir in den hippokratischen „vier Kardinalsäften“ wieder antreffen. Begreiflicherweise kümmerte sich das Volk, das täglich diesen seltsamen Kirchenschmuck zu Gesicht bekam, weniger um das Aussehen der beiden greisen Männer. Jedermann bewunderte nur die kostbaren, in festlich-leuchtender Farbigkeit erstrahlenden Malereien — ganz gleichgültig, welche Persönlichkeiten der Anagneser Kirchenmaler hier

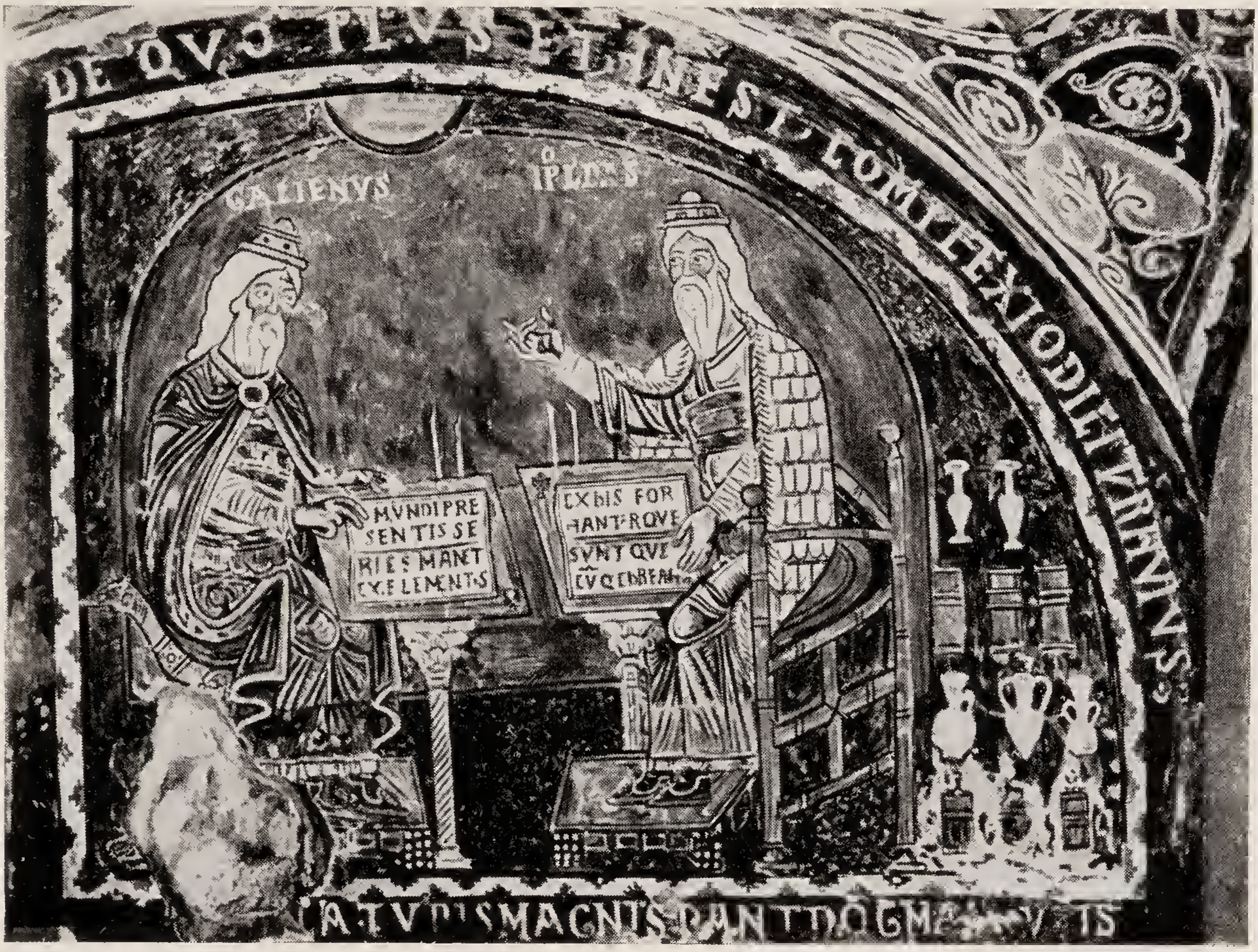
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Abb. 5. Freskogemälde in der Kathedrale von Anagni um 1255.

EIN NEUES ANATOMISCHES EINBLATT AUS DEM 16. JAHRHUNDERT „FOEMINAE MEMBRA DEMONSTRANS“

EIN BEITRAG ZUR VOLKSANATOMIE IM DEUTSCHEN MITTELALTER MIT DER ORIGINALDARSTELLUNG IM TEXT

VON

FRIEDRICH WEINDLER

MIT 1 TEXTABBILDUNG

SONDERDRUCK
AUS DER
ZEITSCHRIFT FÜR ANATOMIE U. ENTWICKLUNGSGESCHICHTE
HERAUSGEGEBEN VON
CURT ELZE
GIESSEN

108. BAND. 3. HEFT.

BERLIN
VERLAG VON JULIUS SPRINGER
1938

Die „Zeitschrift für Anatomie und Entwicklungsgeschichte“ erscheint nach Maßgabe des eingehenden Materials zwanglos, in einzeln berechneten Heften, die zu Bänden wechselnden Umfangs vereinigt werden.

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Alle Manuskriptsendungen sind zu richten an:

Herrn Professor Dr. Curt Elze, Gießen, Anatomisches Institut.

Im Interesse der unbedingt gebotenen Sparsamkeit wollen die Herren Verfasser auf knappste Fassung ihrer Arbeiten und Beschränkung des Abbildungsmaterials auf das unbedingt erforderliche Maß bedacht sein.

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Anleitung zu den Physiologischen Übungen
für Studierende der Medizin
Von Professor Dr. **Wilhelm Trendelenburg**
Direktor des Physiologischen Instituts der Universität Berlin
Mit 31 Abbildungen. XI, 62 Seiten mit Schreibpapier durchschossen. 1938
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VERLAG VON JULIUS SPRINGER IN BERLIN

Ein neues anatomisches Einblatt aus dem 16. Jahrhundert „Foeminae Membra Demonstrans“.

Ein Beitrag zur Volksanatomie im deutschen Mittelalter mit der Originaldarstellung im Text.

Von
Dr. med. **Friedrich Weindler** (München).

Mit 1 Textabbildung.

(Eingegangen am 22. März 1938.)

Ein unerschöpfliches und kostbares Quellenmaterial für die Zeitgeschichte haben uns die volkstümlichen Einblattdrucke des ausgehenden deutschen Mittelalters hinterlassen. Einst ein blühender Geschäftszweig betriebsamer Verleger, eine eindrucksstarke, mächtig wirkende Graphik, die unserem Volke die neuesten aktuellen Tagesgeschehnisse, Erfindungen, geschichtliche und Naturereignisse von Wichtigkeit, allerlei Merkwürdiges auf dem Gebiete der Heilkunde, aber auch Sensationen in unserem Sinne, wie „Moritaten“, Hexen- und Mordprozesse, wundersame Mirakel und Krankenheilungen miterleben ließ, an denen es in jenen Hunger-, Pest- und Kriegsjahrhunderten tatsächlich nicht fehlte. In ihrer Gesamtheit also nichts anderes, als unsere heutigen „*Illustrierten Blätter*“ — die frühesten Erzeugnisse deutscher Publizistik des Mittelalters! Als gut handwerklich vollendete, zumeist farblich wirkende „Flugblätter“ kamen sie ins Haus geflattert, zogen weiter in die Welt hinaus und waren nicht selten auch auf den Märkten und Messen des Landes „umb ein clein ziemlich gelt“ zu erwerben. Nicht Worte, die man doch wieder vergaß, sondern Bilder sollten sprechen, wenn diese auch nicht in allen Stücken der objektiven Wahrheit genügten. Selbst dem Analphabeten sagten sie alles. Wir finden die oft nur in einem Exemplar vorhandenen „Illustrierten“ in den Mappen der Privatsammler, in graphischen Kabinetten, staatlichen und städtischen Bibliotheken, den bekanntesten Offizinen und Kunsthandlungen des mittelalterlichen Nürnbergs, Augsburgs und Straßburgs entstammend. Als lose Blätter, zum Teil in größerem Format, mußten sie sich notwendigerweise sehr bald weithin zerstreuen und verlieren. Das gilt ganz besonders für die *anatomischen* Einblattzeichnungen, die offenbar seinerzeit sehr beliebte Darstellungen waren. Sie zählen heute zu den ganz großen graphischen Seltenheiten; ihr Besitz ist eine anatomische Kostbarkeit ersten Ranges geworden. Ihnen wendet natürlich nicht allein der Anatom, sondern vornehmlich auch der Historiker der Medizin seine vermehrte Aufmerksamkeit zu.

So können wir heute den beiden in unserer Monographie: „Geschichte der gynäkologisch-anatomischen Abbildung“ (Dresden 1908) bereits dargebotenen kolorierten anatomischen Einblättern (vgl. Abb. 83 und 85) eine neue, nur einmalige Originalzeichnung hinzufügen (Abb. 1). Sie gehört zu der charakteristischen, seit dem 16. Jahrhundert in Deutschland auftauchenden Sondergruppe der sog. „*Aufklappbilder*“. Begreiflicherweise schon deshalb in den damaligen Volkskreisen besonders bevorzugt, da sie es ermöglichten, durch Emporheben einzelner übereinandergelagerter Schichten des Rumpfes die verborgene Beschaffenheit des Menscheninneren zu ergründen. Jedenfalls liegt klar zutage, daß die lediglich der Volksaufklärung dienenden buntfarbigen Modebilder *nicht* für Ärzte oder Mediziner bestimmt waren — also keineswegs offizielle Lehrmodelle für den anatomischen Anschauungsunterricht darstellen, wie sie beispielsweise Meister Heinrich von Mondeville in Ermangelung von Leichen zur Demonstration bei seinen anatomischen Lehrvorträgen an der Medizinschule von Montpellier 1304 benutzt hatte[1]. In den Arbeits- und Empfangsstuben der Bader, Barbiere und niederen Wundärzte mögen sie als Aushängeschilder und wirksame Reklamestücke zum Beweis ihrer anatomischen Vorbildung wohl den geeignetsten Platz zu Nutz und Frommen der wißbegierigen Bürger gefunden haben. Indes führt auch die vorliegende „*Tabula Foeminae Membra Demonstrans*“ (40 : 37 cm) wiederum in sinnfälligster Weise vor Augen, wie es um die bildnerische Wiedergabe der Frauenanatomie in derartigen Aufklappfiguren bestellt war. In der Tat schematisch ist alles an dieser ungefügen und wenig ansprechenden Frauengestalt mit blondem bis auf die Schultern herabreichenden Haupthaar. Lediglich mit einem um die Hüften geschlungenen Gewandstück bekleidet, sitzt sie auf einer bunt

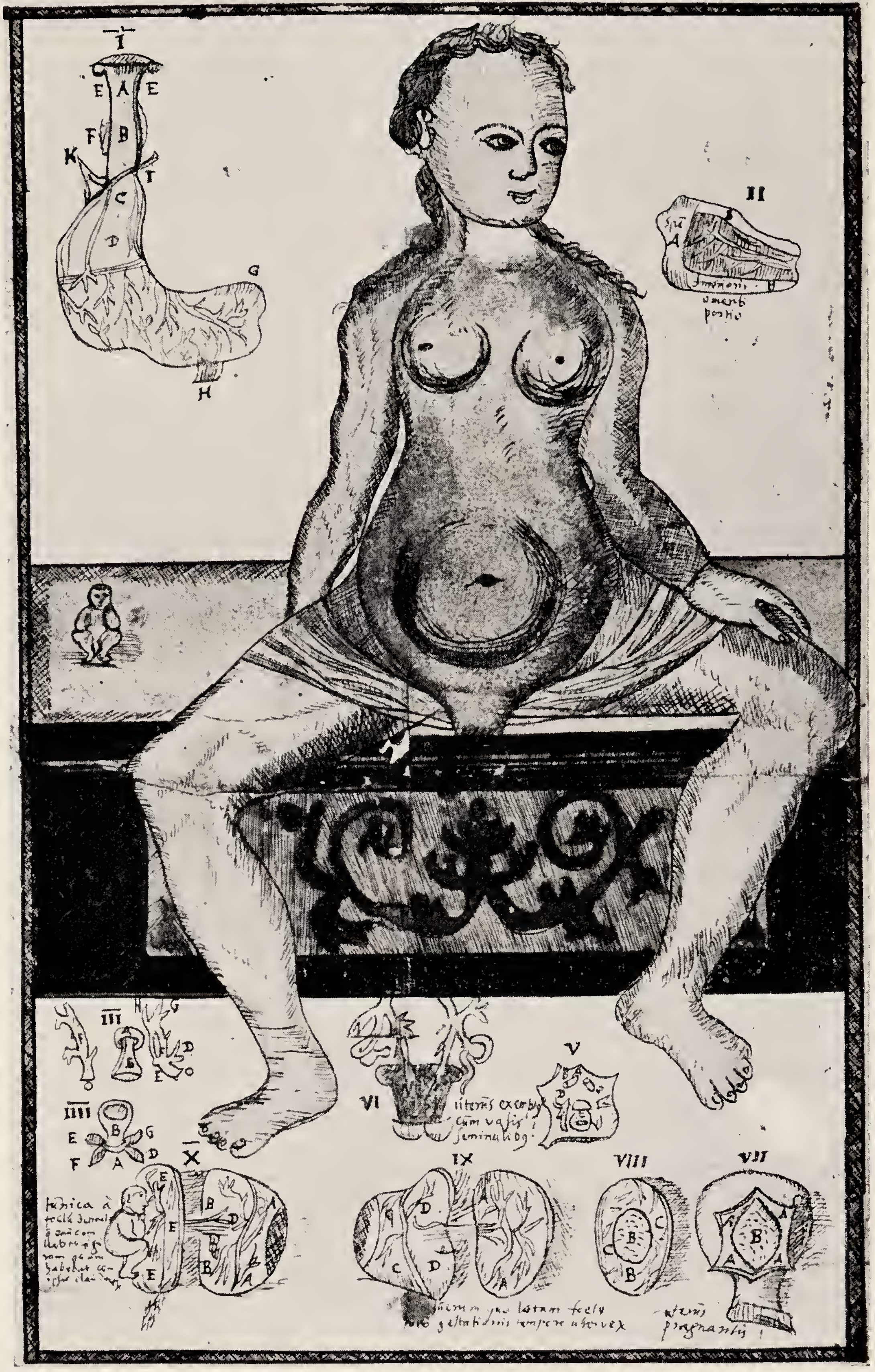

Abb. 1. Aufklappbares Einblatt mit vorvesalischer Anatomie aus dem 16. Jahrhundert.

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[1] Seine 13 selbst entworfenen anatomischen Vorlesungstafeln haben sich leider nicht erhalten (vgl. Guy de Chauliac, chir. magna 1363, Tract. I doct. 1, cap. 1). Sie lassen sich jedoch aus der Pariser HS Nr. 2030 (1314) und der Berliner HS Nr. 219 (1304) rekonstruieren; von uns ertmalig veröffentlicht l. c. Abb. 38—50. Geschichtlich betrachtet, sind Mondevilles Figurentafeln von allergrößter Bedeutung, da sie zum erstenmal im Mittelalter die gleichen lehrhaften Bestrebungen wiederholen, wie sie uns bereits von den großen Alexandrinern in der Antike hinlänglich bekannt sind.

bemalten Holzbank; neben ihr in bescheidener Entfernung der winzige Fetus in kauernder Stellung. Zur Rechten und zu Füßen des Hauptbildes erscheint in charakteristischer Humanistenschrift die lateinische, kurz erklärende Beschreibung der einzelnen Körperorgane. Sie knüpft im wesentlichen — nach dem Vorbild anderer bekannter anatomischer Traktate aus dem Mittelalter, an den großen Pergamener Tierzergliederer GALEN an; ja sogar auf CICEROS Schrift „De natura deorum" wird bezeichnender Weise Bezug genommen. Nach Emporheben der obersten Rumpfwand werden auf gelbem Grund die rot kolorierten Brust- und Baucheingeweide sichtbar, mit schwarzen Großbuchstaben als Hinweise auf die begleitenden Texterklärungen versehen. Die zweite Lage zeigt den kreisrunden introitus vaginae, die vesica urinaria, den fundus uteri mit den an ganz falschem Platz angebrachten, rot bemalten „testiculi" in Form von rundlichen, beerenartigen Gebilden. Von hier aus ziehen nach alter Weise die unstimmigen „Samenblutgefäße" nach den rotfarbigen Nieren. Zuletzt in schwarzer Zeichnung die Rückenwirbelsäule mit 12 Rippenpaaren, das Becken mit seinen breit ausladenden Darmbeinschaufeln — wie es schematischer nicht gedacht werden kann! Ebenso laienhaft und naturfern die kleineren, auf gelbem Untergrund hingezeichneten Nebenfiguren unterhalb des Frauenbildnisses, die uns nochmals die Generationsorgane veranschaulichen sollen. Hier im Bild VI der rot kolorierte Uterus in nicht gravidem Zustand mit den primitiv und unklar ausgefallenen „testes muliebres" und zugehörigen, „vasa seminalia". Dort in den Figuren VII und VIII der eröffnete gravide Uterus — parte sua posteriore — auf dem nach altem Schema die geradezu kindlich hingekritzelten Ausmündungsstellen der maternen Blutgefäße (B „oscula vasorum") zu erkennen sind. Um kein Haar besser die dilettantische Wiedergabe der Embryonalhüllen („involucra") und der Blutgefäßversorgung des Fetus mit einer Nabelschnurumschlingung um den Hals, in den Darstellungen IX und X.

Also hier wieder ein neues, überaus charakteristisches Zeitdokument für die naiven Anschauungen und anatomischen Unvollkommenheiten in den mittelalterlichen Klappfiguren, die ihrerseits wiederum in engster Beziehung stehen zu den zahlreichen, auf älteste Überlieferung zurückgreifenden *Eingeweidesitusbildern* des Mittelalters. Für die naturwahren Formen der menschlichen Organe war aus den schablonenhaften, roh und ungeschickt gezeichneten anatomischen Bilderbögen jedenfalls nichts zu lernen, am allerwenigsten für die damalige Ärzteschaft. Und das alles bemerkenswerterweise zu einer Zeit, da bereits der gewaltige Umschwung in der anatomischen Forschung, vor allem in der bildnerischen Wiedergabe des Selbstgeschauten durch den großen Anatom und Anstürmer gegen GALEN, ANDREAS VESALIUS eingesetzt hatte. Wie schon vor ihm der geniale Schöpfer der bildlichen Anatomie, LIONARDO DA VINCI, hatte er mit offenem Freimut die Schranken des Autoritätsglaubens durchbrochen und sich erkühnt, den Respekt vor der illustrativen Überlieferung für immer aufzukündigen. Die 6 „*Tabulae anatomicae*" [1], die der kaum 23jährige Professor in Padua 1538 vor seiner grundlegenden „Fabrica" herausgab, stellen bekanntlich nichts anderes als anatomische Flugblätter dar. Leicht möglich, daß sie die unmittelbare Anregung zu den Aufklappbildern gegeben haben, deren Erstlinge um dieselbe Zeit in Deutschland auf den Markt kamen. Wie nicht anders zu erwarten, dürften ihre Verfertiger wohl kaum etwas von den neuen Erkenntnissen und ernsten wissenschaftlichen Bestrebungen der wenigen Höhergebildeten erfahren und sie in ihren Einzelheiten obendrein nicht einmal begriffen haben. Als gewinnbringende Handelsobjekte genügten für die breiten Volksschichten selbst die veralteten Schaubilder anatomisch unvollkommener galenischer Weisheit! — Und schließlich noch ein paar Worte über das zeichnerische Entstehen des vorliegenden Einblattes. Am rechten unteren Bildrand findet sich die vollständige Namensnennung des Herstellers: „*Christophorus Schowichten* pinxit hanc figuram Anno 69". Leider blieben die vielfachen Nachforschungen bei maßgebenden Stellen über seine Persönlichkeit völlig ergebnislos. Nur darüber war man sich im allgemeinen einig, daß hier — dem Charakter der Schrift entsprechend — ein „deutscher Humanist, höchstwahrscheinlich ein Arzt oder Mediziner" am Werk gewesen war, der diesen eigenartigen und unterhaltsamen Neuerscheinungen anatomischer Graphik zu Studienzwecken seine besondere Aufmerksamkeit zuwandte. Mag sein! Dazu würde stimmen, daß sich vor Jahren in eigener Sammlung noch zwei weitere anatomische Aufklappfiguren von *Chr. Schowichten* befunden haben. Selbstverständlich kommen auch noch andere Interessenten, so berufsmäßige Kunsthändler, Bilderfreunde und Amateur-Anatomen hier in Frage, die sich mit den begehrten Einblattzeichnungen eingehender beschäftigten. Vor allem bemühten sich aber, wie bereits angedeutet, im 16. Jahrhundert, da allerwärts Kunst und Handwerk in ersprießlichster Zusammenarbeit noch eng verbunden waren, die bedeutensten deutschen Formschneider und Kunstverleger die zeitgemäßen Bilderserien auf den Markt zu bringen, um sie zum Gemeingut aller zu machen. Die *älteste* in Deutschland als Einblattdruck vervielfältigte anatomische Abbildung ist ein Skelet nach der Zeichnung des Pariser „artium et medicinae doctor" RICHARD HELAIN, gedruckt zu Nürnberg im Jahre 1493 [1]. Und im gleichen Jahr wie VESALs 6 anatomische Tafeln, erscheint von der Meisterhand des berühmten Augsburger „fürmsnyders" *Jobst de Negker* die überaus wertvolle und anscheinend der Anatomie des KETHAM entlehnte „Anothomia oder abconterfectung eines Weybs leyb, wie er inwendig gestaltet ist" [2]. Die auf einer Holzbank sitzende Frauengestalt läßt Bauchdecken und Brust, sowie Baucheingeweide in mehreren Schichten aufklappen. Mit der *Negker*schen Figurentafel *war die vorbildliche Grundform für sämtliche weibliche Aufklappdarstellungen der Folgezeit geschaffen.* Bis auf ganz unwesentliche Abweichungen werden sie immer wieder vollständig und getreu nachgezeichnet. Wir begegnen ihnen 1539 in der „Anothomia" des Straßburger Formschneiders und Kunsthändlers *Heinrich Vogther* [1], des Straßburger *Jacobus Jucundus* 1551, ferner in den Nürnberger Drucken durch *Hans Weygel* (1556) und *Hans Guldenmundt* (o. J.), schließlich in den Holzschnitten des Nürnberger „Brieffmalers" *Matthes Rauch* (1584) und des *Georg Lang* 1588. Das eine oder andere der erstgenannten Exemplare muß also bestimmt dem Verfertiger unserer weiblichen Einblattzeichnung vorgelegen haben, die er mit Haupt und Nebenfiguren unter Hinzufügen der allgemein üblichen Organerklärungen dem Urdruck auf das genaueste nachgebildet hat.

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[1] Sie erschienen also genau vor 400 Jahren im Anschluß an VESALS ersten anatomischen Demonstrationen in Padua als Lehrbehelf für den anatomischen Unterricht zu Venedig: „Imprimebat B(ernardinus). Vitalis, Venetus, sumptibus Joannis Stephani Calcarensis. Prostant vero in officina D. Bernardi. A. 1538".

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[1] Noch völlig unaufgeklärt ist, wie das Flugblatt R. HELAINs (die immer wieder anzutreffende Namensnennung „RICARDUS HELA" ist nirgends zu finden) nach Nürnberg und hier in den Holzschnitt kam. Abbildungen unter andern in H. PETERs, Arzt u. Heilkunde, Fig. 26; in K. SUDHOFFs Archiv für Geschichte der Medizin, 1907, H. 1, Fig. 4. Einige wertvolle und seltene Flugblätter aus der übrigen Medizin seien hier kurz genannt: der Nürnberger kolorierte Einblattholzschnitt mit dem „Gastmahl der Sondersiechen" 1493. Die erste Darstellung der Syphilis auf dem Nürnberger Flugblatt des friesischen Dichterarztes und Stadtmedicus in Nürnberg DIETRICH ULSENIUS vom Jahre 1496; ohne völlig sichere Begründung wird die Zeichnung *Albrecht Dürer* zugeschrieben. Das religiöse Syphilisblatt *St. Minus*, gedruckt 1495/96 von *Wolfgang Hamer*, Nürnberg (vgl. K. SUDHOFF, Graphische und typographische Erstlinge der Syphilisliteratur aus den Jahren 1495 und 1496). Unzweifelhaft sind die zahlreichen Einblätter mit Darstellungen „seltsamer und monstroser Wundergeburten" als reine Phantasieprodukte zu bewerten.

[2] Vgl. die Abbildungen bei A. M. PACHINGER, Die Mutterschaft, Fig. 14 und F. WEINDLER, l. c. Fig. 86. L. CHOULANT gibt unzutreffenderweise das *Vogther*sche Klappbild als das älteste an.

Auffallenderweise bringt die allbekannte, heutigentags freilich nicht mehr völlig ausreichende „Geschichte der anatomischen Abbildung" des Altmeisters Ludwig Choulant (Leipzig 1852) keine einzige hierher gehörige Bildurkunde, obwohl er selbst die meisten Originaldrucke vor Augen hatte. Um so wertvoller für den Wissenschaftler die vorliegende Figurentafel, die nicht allein für den geschichtlichen Werdegang anatomischer Graphik im deutschen Mittelalter, sondern vor allem auch für die damalige Geistesrichtung und den deutschen Volksgeschmack beredtes Zeugnis ablegt. Ihr besonderer Wert liegt sicherlich nicht in dem künstlerischen Gehalt, als vielmehr in der Eigenart und Seltenheit der Darstellung. Entsprechend der Volkstümlichkeit und großen Beliebtheit derartiger Anatomiebilder in Schichtenform kann es jedenfalls nicht wundernehmen, daß sie in Deutschland ein langes Weiterleben führten. Technisch verbessert und in wissenschaftlicher Beziehung vervollkommnet, gehen sie durch die folgenden Jahrhunderte, finden ihren Platz in größeren anatomischen Druckwerken [2] und werden als bequemes Anschauungs- und Belehrungsmittel dem allgemeinen Unterricht dienstbar gemacht. Selbst in belehrenden medizinischen Volksbüchern für den Hausgebrauch erscheinen sie in unserer Zeit, um den bildungsbedürftigen breiten Volksschichten die nötigsten anatomischen Kenntnisse zu vermitteln. Tatsächlich kann es zur Förderung der Volksbildung- und Aufklärung nur von Nutzen sein, wenn jeder Mensch etwas mehr vom Bau des eigenen Körpers wüßte, der leider den meisten noch so fremd ist, wie ferne Länder und Völker.

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[1] Mit allergrößter Wahrscheinlichkeit haben die am häufigsten nachgebildeten *Vogther*schen Blätter dem *Chr. Schowichten* vorgelegen. Überdies dürfte dem Straßburger *Vogther* die *illustrierte* Ausgabe der berühmten „Anothomia" des Bologneser Arztes Mondino dei Luzzi sicherlich bekannt gewesen sein, die 1513 von dem Straßburger Physikus Johannes Adelphus herausgegeben wurde.

[2] So z. B. die zusammengesetzten Tafeln in Buchform: Auslegung und Beschreibung der „Anathomie" des Johann Froelich, Straßburg 1544; das bekannte: Catoptrum microcosmicum des Ulmer Arztes Johann Remmelin, Augsburg 1619 (s. F. Weindler, l. c. Fig. 109 und 110); L. Christ. von Hellwig: Nosce te ipsum vel anatomicum vivum, Frankfurt 1720 in eigener Sammlung.

Aufnahmebedingungen.

I. Sachliche Anforderungen.

1. Der Inhalt der Arbeit muß dem Gebiet der Zeitschrift angehören.

2. Die Arbeit muß wissenschaftlich wertvoll sein und Neues bringen. Bloße Bestätigungen bereits anerkannter Befunde können, wenn überhaupt, nur in kürzester Form aufgenommen werden. Dasselbe gilt von Versuchen und Beobachtungen, die ein positives Resultat nicht ergeben haben. Arbeiten rein referierenden Inhalts werden abgelehnt, vorläufige Mitteilungen nur ausnahmsweise aufgenommen. Polemiken sind zu vermeiden, kurze Richtigstellung der Tatbestände ist zulässig. Aufsätze spekulativen Inhalts sind nur dann geeignet, wenn sie durch neue Gesichtspunkte die Forschung anregen.

II. Formelle Anforderungen.

1. Das Manuskript muß leicht leserlich geschrieben sein. Die Abbildungsvorlagen sind auf besonderen Blättern einzuliefern. Diktierte Arbeiten bedürfen der stilistischen Durcharbeitung zwecks Vermeidung von weitschweifiger und unsorgfältiger Darstellung. Absätze sind nur zulässig, wenn sie neue Gedankengänge bezeichnen.

2. Die Arbeiten müssen *kurz* und in gutem Deutsch geschrieben sein. Ausführliche historische Einleitungen sind zu vermeiden. Die Fragestellung kann durch wenige Sätze klargelegt werden. Der Anschluß an frühere Behandlungen des Themas ist durch Hinweis auf die letzten Literaturzusammenstellungen (in Monographien, „Ergebnissen“, Handbüchern) herzustellen.

3. Der Weg, auf dem die Resultate gewonnen wurden, muß klar erkennbar sein; jedoch hat eine ausführliche Darstellung der Methodik nur dann Wert, wenn sie wesentlich Neues enthält.

4. Jeder Arbeit ist eine kurze Zusammenstellung (höchstens 1 Seite) der wesentlichen Ergebnisse anzufügen, hingegen können besondere Inhaltsverzeichnisse für einzelne Arbeiten nicht abgedruckt werden.

5. Von jeder Versuchsart bzw. jedem Tatsachenbestand ist in der Regel nur *ein* Protokoll (Krankengeschichte, Sektionsbericht, Versuch) im Telegrammstil als Beispiel in knappster Form mitzuteilen. Das übrige Beweismaterial kann im Text oder, wenn dies nicht zu umgehen ist, in Tabellenform gebracht werden; dabei müssen aber umfangreiche tabellarische Zusammenstellungen unbedingt vermieden werden [1].

6. Die Abbildungen sind auf das Notwendigste zu beschränken. Entscheidend für die Frage, ob Bild oder Text, ist im Zweifelsfall die Platzersparnis. Kurze, aber erschöpfende Figurenunterschrift erübrigt nochmalige Beschreibung im Text. Für jede Versuchsart, jede Krankenbeschreibung, jedes Präparat ist nur *ein* gleichartiges Bild, Kurve u. ä. zulässig. Unzulässig ist die *doppelte* Darstellung in Tabelle *und* Kurve. *Farbige* Bilder können nur in seltenen Ausnahmefällen Aufnahme finden, auch wenn sie wichtig sind. Didaktische Gesichtspunkte bleiben hierbei außer Betracht, da die Aufsätze in den Archiven nicht von Anfängern gelesen werden.

7. Literaturangaben, die nur im Text berücksichtigte Arbeiten enthalten dürfen, erfolgen ohne Titel der Arbeit nur mit Band-, Seiten-, Jahreszahl. Titelangabe nur bei Büchern.

8. Die Beschreibung von Methodik, Protokollen und anderen weniger wichtigen Teilen ist für *Kleindruck* vorzumerken. Die Lesbarkeit des Wesentlichen wird hierdurch gehoben.

9. Das Zerlegen einer Arbeit in mehrere Mitteilungen zwecks Erweckung des Anscheins größerer Kürze ist unzulässig.

10. Doppeltitel sind aus bibliographischen Gründen unerwünscht. Das gilt insbesondere, wenn die Autoren in Ober- und Untertitel einer Arbeit nicht die gleichen sind.

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[1] Es wird empfohlen, durch eine Fußnote darauf hinzuweisen, in welchem Institut das gesamte Beweismaterial eingesehen oder angefordert werden kann.

Die Mißbildungen und Anomalien der Nase und des Nasenrachenraumes

Von

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Mit 153 Abbildungen im Text. VIII, 319 Seiten. 1938. RM 36.—; gebunden RM 38.70

Inhaltsübersicht:

Einleitung. — **I. Entstehung der Mißbildungen im allgemeinen.** Neuere Ergebnisse der Vererbungs- und Mißbildungsforschung. Differentialdiagnose zwischen Heredopathien und nicht-keimbedingten Mißbildungen. Der Entstehungszeitpunkt der Mißbildungen. Grundlegende Ergebnisse der experimentellen Teratologie. — **II. Experimente am Nasalorgan.** Störungen der Nasenentwicklung. Versuche über Exstirpation, Transplantation, Regeneration und Superregeneration der Nase. Zusammenfassung der experimentellen Ergebnisse. — **III. Die Mißbildungen und Anomalien der Nase.** Arhine und hyporhine Fehlbildungen. Nasenverdoppelung. Hirnbrüche und neurogene Tumoren im Bereiche der Nase. Mit den Gesichtsspalten zusammenhängende nasale Fehlbildungen. Anomalien des nasalen Stützgerüstes. Die Nasenverschlüsse (Atresien und Synechien). Varianten, Anomalien und Mißbildungen der lateralen Nasenwand. Varianten, Anomalien und Fehlbildungen im Bereiche der medialen Nasenwand. Varianten und Anomalien des Nasenbodens und der Apertura piriformis. Diverse Konstitutionsanomalien. Schädelanomalien und Nasenausbildung. Ätiologie der Varianten, Anomalien und Fehlbildungen der Nase. — **IV. Die Mißbildungen und Anomalien des Nasenrachenraumes.** Anatomische Vorbemerkungen. Varianten und Anomalien der knöchernen Epipharynxwände. Varianten, Anomalien und Fehlbildungen in den Weichteilen des Nasenrachendaches (Tonsilla pharyngea und Bursa pharyngea). Varianten, Anomalien und Fehlbildungen im Bereiche der Weichteile der lateralen Epipharynxwand. Epignathi bzw. Teratome des Epipharynx, teroide Tumoren („behaarte Rachenpolypen“ und Mischgeschwülste). Diverse Tumoren des Epipharynx, welche auf anomalem Verhalten einzelner Gewebsbestandteile beruhen. Anomalien und Mißbildungen des Nasenrachenraumes im Zusammenhang mit der Bildung des Hypophysenvorderlappens. Die Cephalocele sphenopharyngea. Gefäßanomalien. Ätiologie der Varianten, Anomalien und Fehlbildungen des Nasenrachenraumes. — Literaturverzeichnis. Sachverzeichnis.

Das Buch steckt sich das Ziel, auf Grund des bisher vorliegenden und durch eigene Untersuchungen wesentlich ergänzten Tatsachenmaterials eine vollständige und ins einzelne gehende Darstellung der Mißbildungen und Anomalien der Nase und des Nasenrachenraumes zu geben, wobei insbesondere auch auf praktische Interessen Rücksicht genommen wird. Hierbei wurden die Grenzen zwischen Normal und Abnormal nicht wie sonst von der Seite des Normalen her abgesteckt, sondern von der Seite der Mißbildungen und Anomalien und dabei auch der anatomischen Varianten ausführlich gedacht. Der neuesten Anschauungen über formale und kausale Genese inklusive Anlagefehler wurde weitgehend Rechnung getragen. Bezüglich der nicht-keimbedingten Mißbildungen wurde versucht, den Zeitpunkt der Mißbildungsentstehung genauer zu datieren. Zum besseren Verständnis des Ganzen wurde den speziellen Ausführungen ein größerer allgemeiner Abschnitt vorausgeschickt, der sich unter anderem auch mit den Ergebnissen der allgemeinen und experimentellen Teratologie mit besonderer Berücksichtigung der nasalen Fehlbildungen beschäftigt. Da hier alle Formabweichungen der Nase und des Nasenrachenraumes zusammengetragen wurden, kann die erreichte Plattform als Ausgangspunkt für weitere Vorstöße zur Aufhellung der formalen und kausalen Genese der nasalen Fehlbildungen benützt werden.

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Die Harnschau im Volksglauben und in der Wissenschaft.

Von Dr. **M. WEISS**, em. Primararzt (Wien).

Die Harnschau könnte manchem vielleicht etwas abseits von den Hauptströmungen der gegenwärtigen Medizin zu liegen scheinen, welche in erster Reihe auf der physikalischen Untersuchung, der Bakteriologie, Serologie und Röntgenologie aufgebaut ist. Wir dürfen uns jedoch nicht verhehlen, daß gegen die Zersplitterung der Medizin in viele Einzelfächer, von welchen jedes den Vorrang vor den andern beansprucht, sich ein starker Widerstand auch in ärztlichen Kreisen geltend macht und daß mit Recht die Forderung gestellt wird, den ganzen Menschen und nicht seine einzelnen Teile zum Gegenstand der diagnostischen und therapeutischen Bestrebungen zu machen. Von hier ist nur ein Schritt zur zweiten Forderung, den Menschen nicht erst in der Krankheit, sondern schon zur Zeit wirklicher oder scheinbarer Gesundheit ärztlich zu betreuen. Dies verlangt ein besonders in Amerika in Ausbildung begriffener Zweig der Heilkunde, welcher als Präventiv- oder Gesundenmedizin bezeichnet wird.

Versenken wir uns in die Denk- und Heilweise der alten Ärzte, so sehen wir den Blick auf das Ganze viel stärker ausgeprägt, als es heute der Fall ist. Die alte Medizin sprach von kranken Säften und betrachtete die Krankheiten als Ausdruck der schlechten Beschaffenheit oder Mischung des Blutes. Sie ist hauptsächlich eine Humoral- und weniger eine Zellular- oder Organmedizin gewesen. Die Fortschritte, welche uns die neue Zeit gebracht hat, dürfen nicht unterschätzt werden. Aber sie befriedigen heute nicht mehr voll und ganz. Denn über dem erkrankten Einzelorgan, welches mit Salben und Tinkturen, mit Messer und Pinzette angegangen wird, wird häufig der ganze Mensch vergessen, der ein lebendes Wesen darstellt, in welchem eines in das andere greift, das Ganze vom Teil und der Teil wieder vom Ganzen beeinflußt wird.

Fragen wir uns nach den Hilfsmitteln, welche die alten Ärzte befähigt haben, mehr den kranken Menschen als die Krankheit zu behandeln, so stoßen wir auf ein Verfahren, das Jahrtausende hindurch zu ihrem Rüstzeug gehörte und das in der Geschichte der

Medizin als Harnschau oder Uroskopie bekannt ist. Es wäre verfehlt, wenn wir, wie dies vielfach geschieht, geringschätzig von dieser Kunst sprechen wollten. Mit Leube,[1] dem hervorragenden Internisten des ausgehenden 19. Jahrhunderts, dürfen wir, wenn wir ehrlich sind, sagen, „daß jene Ärzte wenigstens alles, was in ihren Kräften stand, taten, um mit der Harnbesichtigung Anhaltspunkte für die Diagnose zu gewinnen, daß dagegen unsere Zeit, so leicht ihr durch die enormen Fortschritte der Chemie die Analyse des Harnes gemacht ist, dem letzteren nicht die entsprechende Berücksichtigung zu teil werden lasse“.

An die Harnschau knüpft das erste systematische Denken in der Medizin an. Ist doch die Änderung im Aussehen des Harns, welche in so vielen Krankheiten fast gesetzmäßig auftritt, eine so auffallende Erscheinung, daß an ihr die Ärzte aller Zeiten nicht achtlos vorübergehen konnten. Schon in der uralten indischen Medizin werden 10 Arten pathologischer Harnsekretion unterschieden, unter anderem der spärliche, der schaumige, der sandige und der Zuckerurin. In der Medizin des Altertums, des Mittelalters und bis gegen die Mitte des vorigen Jahrhunderts bildete die Harnschau einen integrierenden Bestandteil der ärztlichen Kunst.

Der Harn wird gemäß der bei den alten Ärzten herrschenden Auffassung von der Kochung (Pepsis) oder Verdauung der Nahrung, wie sie in den verschiedenen Organen, besonders aber in der Leber stattfindet, als letzte Seihe des Blutes angesehen.[2] eine Auffassung, der wir auch heute gar nichts entgegenstellen können. Die hippokratische Medizin betont die Wichtigkeit der Urinbeobachtung; der Arzt, heißt es bei Hippokrates, müsse beobachten, ob der Harn des Kranken dem des Gesunden gleich ist. Je weniger dies der Fall ist, umso kranker ist er.

Der größte Teil jener Kenntnisse, die als Lehre von der Harnschau sich von Schule zu Schule fortpflanzten, ist im Laufe des letzten Jahrhunderts verloren gegangen, obgleich sie Jahrtausende hindurch die Grundlage des ärztlichen Wissens und Könnens bildeten. Einen wie nachhaltigen Einfluß aber dieser Teil der Medizin auf die Vorstellungswelt früher hatte, sehen wir aus dem Niederschlag der Uroskopie in der darstellenden Kunst. Zahlreich sind die Bilder, welche im Holzschnitt, in der Malerei und auch in der Plastik den harnbeschauenden Arzt zum Gegenstande haben.

Einige nicht unbedeutende Reste dieser Art der Krankheitsbeurteilung sind in die moderne Medizin übergegangen und geben auch jetzt noch, vielfach unbewußt, dem Arzte wichtige Hinweise auf das Krankheitsgeschehen. Auch der heutige Arzt kennt den roten Fieberharn, den sattgelben Harn bei vielen auszehrenden Krankheiten, den lichten Harn bei der Schrumpfniere und der

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[1] Salkowski und Leube, Die Lehre vom Harn. Hirschfeld, Berlin 1882.

[2] Οὖρον ἔστὶ τὸ περίῆθημα τοῦ αἵματος (Hippokrates).

Zuckerharnruhr. Der bierbraune Harn des Gelbsüchtigen, der schwarze mancher Geschwulstformen und Vergiftungen ist so charakteristisch, daß er eine Diagnose auf den ersten Blick erlaubt. Aber wie schon Leube geklagt hat „halten es viele Ärzte unter ihrer Würde, den Harn zu betrachten und blicken mit

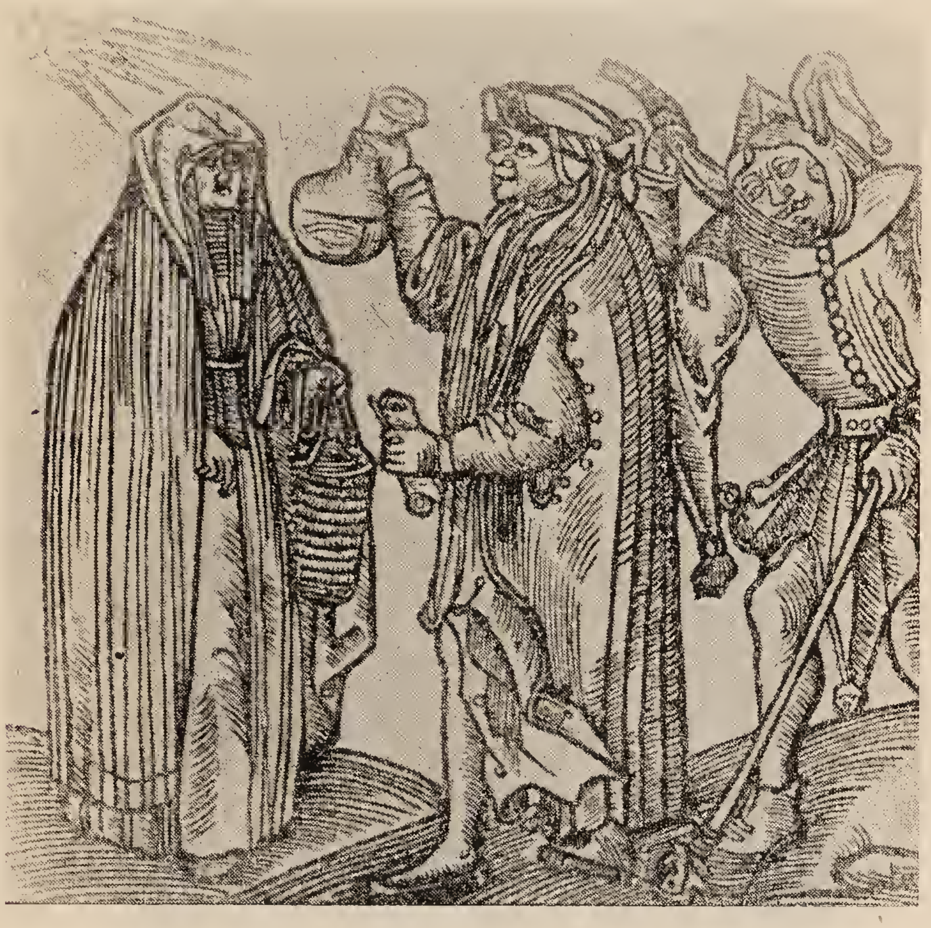

Abb. 1. Harnbeschauender Arzt in der Satire.

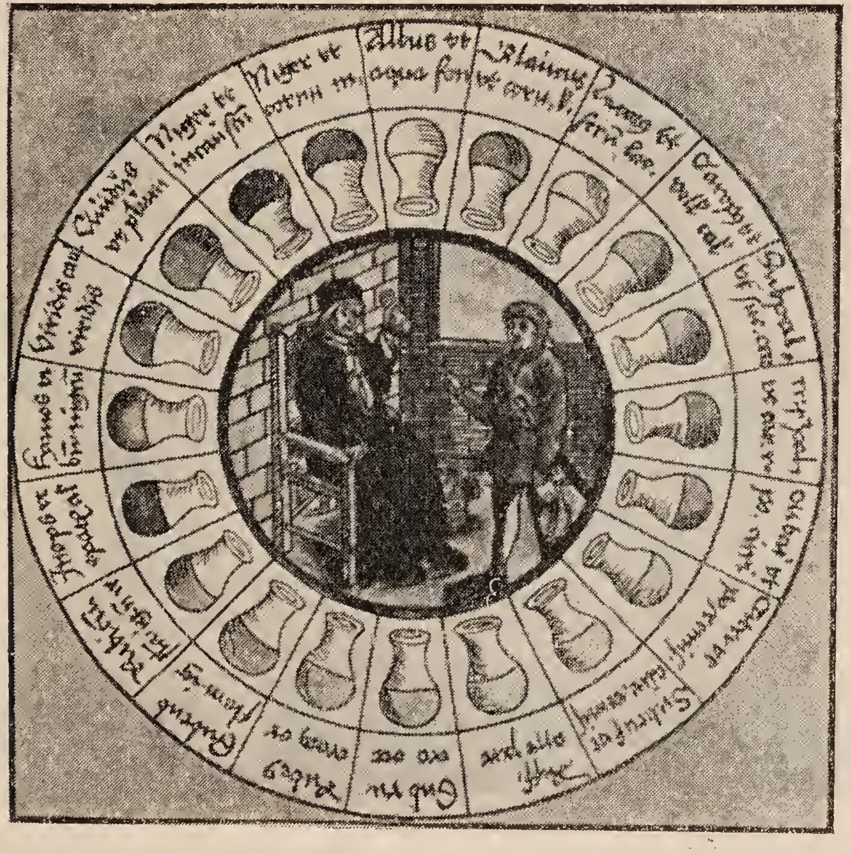

Abb. 2. Gefärbte Harnscheibe aus einem Buch des Arztes Udalricus Binder (16. Jahrh.).

Gleichgültigkeit, um nicht zu sagen, mit Verachtung auf jene Bestrebungen der alten Ärzte, die Zeugnis ablegen vom ernstesten Suchen nach Erkenntnis der tieferen Vorgänge im Organismus“. Die neuen Zweige am Baume der Medizin haben den älteren Zweig überwuchert, der aber, wenn nicht alle Zeichen trügen, heute wieder berufen erscheint, frische Blüten und Früchte zu zeitigen.

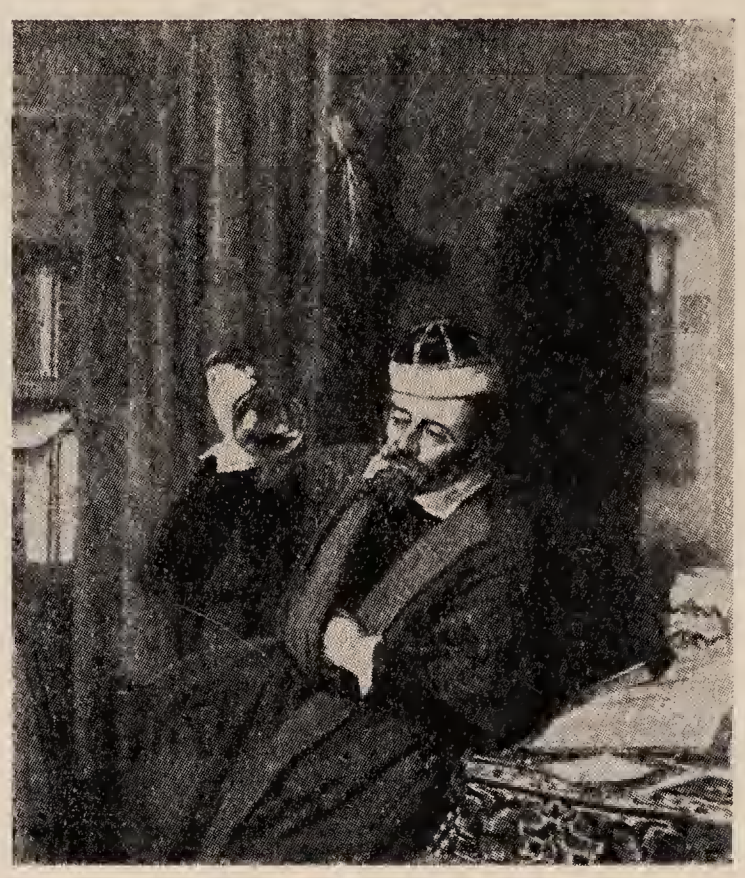

Abb. 3. Adrien van Ostade: Der Arzt zu Hause (Berliner Museum).

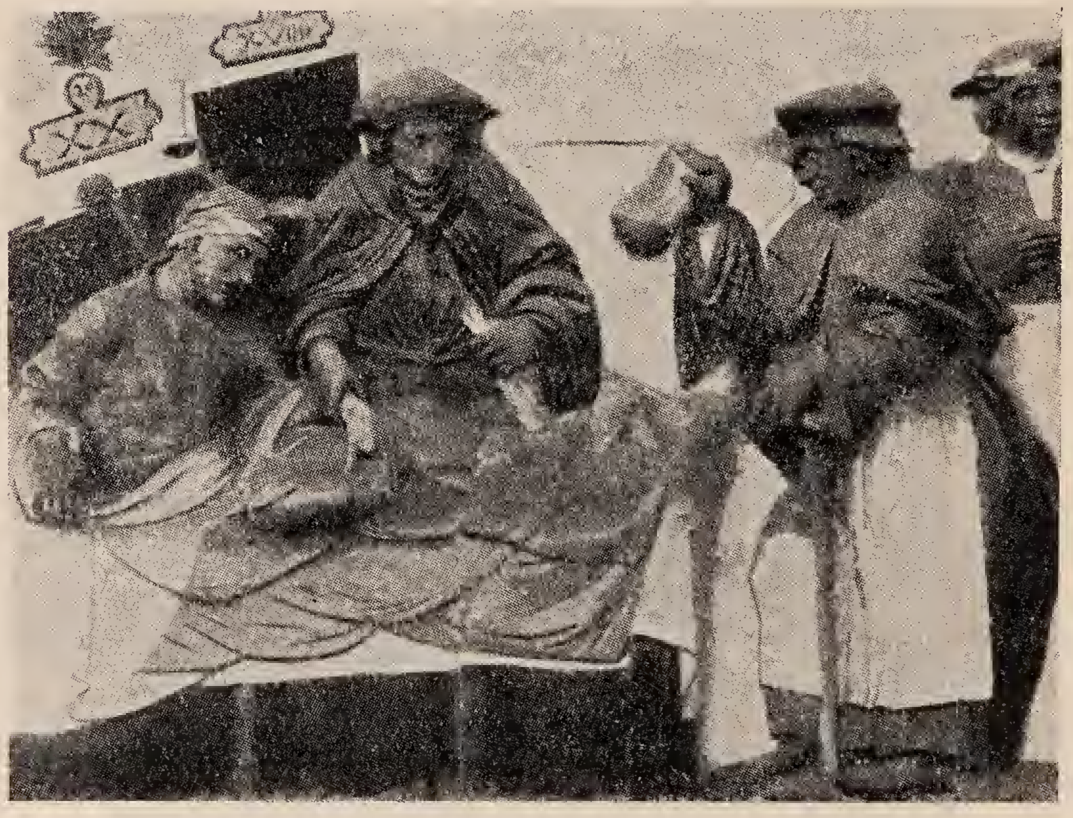

Abb. 4. Bas-Relief in Terracotta im Ospedale des Ceppo zu Pistoja in Italien: Die innere Medizin von den Brüdern Giovanni und Girolamo della Robbia.

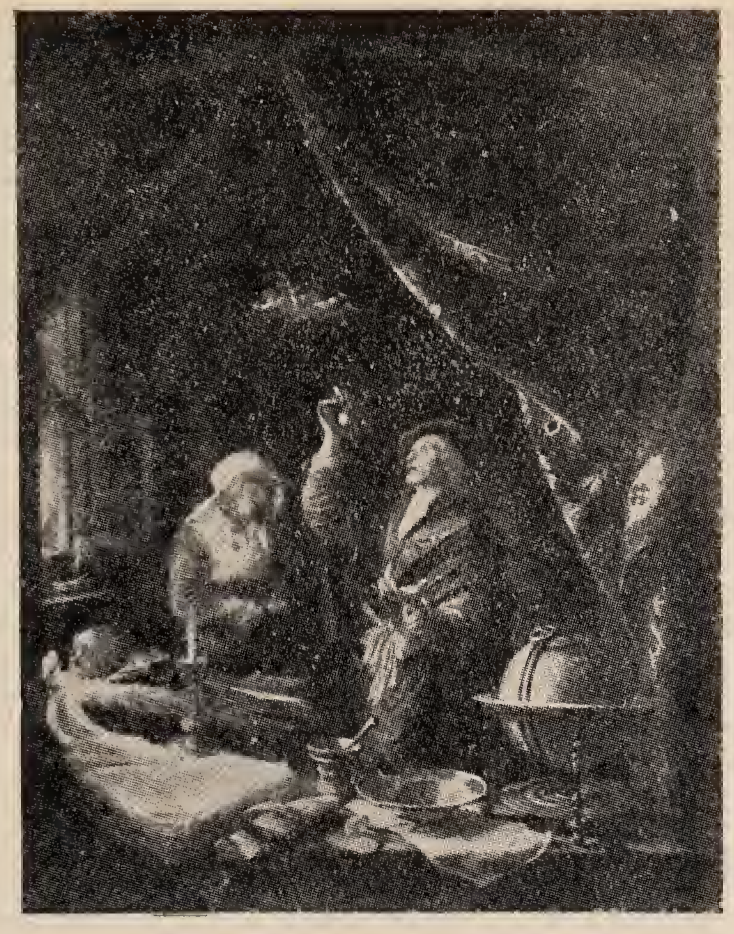

Abb. 5. Gerard Dou: Die Urinprobe.

Die Harnschau früherer Jahrhunderte hat Zuflucht gefunden in der Volksmedizin, wo sich ihrer aber fast ausschließlich Scharlatane bemächtigt haben, die aus dem Aussehen des Harns allein Schlüsse auf die Art, den Verlauf und die Behandlung der Krankheiten ziehen wollen. Dies tut die moderne Harnschau nicht, da sie die Harnbetrachtung nur als einen Teil einer gründlichen Gesamtuntersuchung des Harns gelten läßt und auch die Harnuntersuchung nicht losgelöst vom sonstigen Krankheitsbilde verwerten will. Die wissenschaftliche Kontrolle der meist bäuerlichen Harnbeschauer hat ergeben, daß sie mit einem kleinen Prozentsatz von Zufallstreffern arbeiten, daß ihre Kenntnisse aber einer ernsteren Nachprüfung nicht standhalten können. Mystizismus, verbunden mit den Resten der mittelalterlichen Harnkunde finden wir in den Lehren dieser Harnbeschauer[3]) wieder, welche von Zirkel, Nebel und Kleie im Harn sprechen und die gefärbte Harnscheibe bei der Beurteilung von Gesundheit und Krankheit zu Rate ziehen, so wie die Astrologen etwa das menschliche Leben und Schicksal sich im Tierkreis wiederspiegeln sehen. Aber diese Scharlatane haben einen ungeheuren Zulauf, und die Zuflucht zu den Harnbeschauern ist vielleicht eine Art Reaktion auf die Vernachlässigung eines Zweiges der Heilkunde durch die Schulmedizin, welche dem naiven Volksempfinden bedeutungsvoll genug erscheint, um eine gesonderte

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[3]) Amalie Hohenester, Die Urinkunde zit. nach Leube.

Aufmerksamkeit zu verdienen. Darum wollen wir es uns nicht verdrießen lassen, auf kurze Zeit hinabzusteigen in die verschütteten Schächte einer vergangenen Epoche, um dann wieder zur Gegenwart zurückzukehren.

Schalten wir die aus Scharlatanerie, Gewinnsucht und Unwissenheit stammende betrügerische Harnschau aus, so unterliegt es keinem Zweifel, daß die früheren Ärzte viel aus der Betrachtung des Harnes und seiner Veränderungen zu erkennen vermochten, was für die Erkennung und Behandlung der Krankheiten von Wert war. Theophilus, welcher im VII. Jahrhundert in Byzanz lebte, lehrt: Der Verlauf einer fieberhaften Krankheit ist umso besser, je heller und reichlicher der Harn fließt, eine Anschauung, die wir auch heute ohne weiteres unterschreiben können. Ferner: Wenn der Harn am vierten Tag einer fieberhaften Krankheit eine rote Wolke hat, zeigt dies an, daß die Krankheit am siebenten Tag zur Krise gelangen wird, womit offenbar das Verhalten bei prognostisch günstigen Lungenentzündungen gemeint war. Der Harn der Zuckerkranken wurde von Theophilus richtig charakterisiert: Er ist farblos, reichlich und frei von Niederschlägen. Aber die alten Ärzte wußten auch, daß der Harn bei Nierenleiden ebenso hell sein kann, wie bei der Zuckerkrankheit, nur daß er in der Regel spärlicher abgeschieden wird, und daß der Unterschied außerdem darin besteht, daß der Harn des Nierenkranken wegen seines Eiweißgehaltes beim Schütteln einen kräftigen, sich lange erhaltenden Schaum und beim Abdampfen ähnlich wie die Milch, ein Häutchen aus Eiweiß an der Oberfläche bildet. Folgende Lehre geht bis auf das erste christliche Jahrhundert zurück: Bei mäßig affiziertem Gehirn — womit offenbar der Grad des Fiebers gemeint war —, ist der Harn rot, bei größerer Hitze wein- oder fast blutrot. Die Leber von Hitze affiziert, produziert goldgelben bis olivengrünen Harn. Wir dürfen bei der Beurteilung dieser und ähnlicher Aussprüche nicht vergessen, daß wir es mit einer Zeit zu tun hatten, in welcher der Fieberthermometer noch nicht bekannt war, und man zur Beurteilung der Art und Intensität des Fiebers, als dessen hervorstechendstes Merkmal Schmerzen und Eingenommenheit des Kopfes in Erscheinung treten, nur auf die Betrachtung des Harnes angewiesen war.

Hippokrates sieht es als ein Zeichen von Gesundheit an, wenn der Harn einen weißen, glatten, gleichmäßigen Bodensatz ausfallen läßt. Die Kommentatoren späterer Zeiten bauen diese Lehre weiter aus; der Bodensatz des normalen Harnes soll weder Blasen bilden, noch sich wölben und dem Glase anhaften. Dabei kommen schon Schlüsse vor, die uns heute manchmal lächerlich erscheinen, indem den harmlosesten Vorkommnissen übertriebene Wichtigkeit beigemessen wird. So sind nach einem frühmittelalterlichen Lehrer der Harnschau die Blasen im Urin Zeichen eines fremden Pneumas oder Geistes. Stehen dieselben an der Peripherie (corona) der Urinoberfläche, und zwar in ununterbrochener Reihe, so zeige dies eine Kopfaffektion und große Schmerzen an, schwächere, wenn sie mehr zerstreut in der Corona stehen. Je intensiver goldgelb die Blasen gefärbt sind, umso vehementer ist der Kopfschmerz; der schwach ist oder ganz fehlt, wenn die Färbung der Blasen weiß ist. Daß die Blasen bis an die Oberfläche aufgestiegen sind, beweise, daß das Pneuma bis zum Kopf gestiegen ist. Ein Zeichen vorzüglicher Beobachtung ist dagegen folgender Lehrsatz:

> Renum, vesicae lapidem testantur arenae,
> Renum, si rubeae, vesicae si magis albae;

oder auf deutsch

> Sand ist ein Zeichen von Steinen, der Niere oder der Blase,
> Der Nieren, wenn rot, der Blase, wenn weiß mehr die Farbe.[4]

Die römische Medizin gibt als diagnostisch verwertbare Zeichen an: Den dicken, weißlich getrübten Harn, der bei Schmerzen in den Gliedern und in den Eingeweiden auftritt, womit offenbar der Gichtharn gemeint ist. Sie kennt die Eiterbeimengung zum Harn als Ausdruck einer Erkrankung der Nieren- und Harnwege. Ein schäumender, übelriechender, bald Gries, bald Blut führender Harn deute bei häufigem Harndrang auf eine Erkrankung der Nieren; tropft er langsam ab, ist er mit Blut untermischt und schmerzt dabei die Schamgegend, so liegt ein Blasenleiden vor. Diesen von Corn. Celsus stammenden Satz können wir auch heute noch im großen Ganzen als richtig bezeichnen. Dagegen erscheinen auf den ersten Blick weniger verständlich die bei demselben Autor vorkommenden Sätze betreffs der Verwertung des Niederschlags: Ein grünliches oder bleigraues Sediment ist ein schlechtes Zeichen, ein noch schlechteres, wenn dünne weiße Fäden, das schlechteste, wenn kleienartige Wolken sich im Harn finden. Versenken wir uns aber in die Betrachtungsweise der alten Ärzte und lassen es uns nicht verdrießen, die am Harn in krankhaften Zuständen auftretenden Veränderungen mit Aufmerksamkeit zu verfolgen, so sehen wir, daß in diesen aus der Erfahrung abgeleiteten Schlußfolgerungen fast immer ein wahrer Kern steckt.

Nach einem noch heute herrschenden Volksglauben wurde die Harn- oder wie sie auch früher hieß, Brunnenschau, zumeist nur des Morgens vorgenommen. Nach der Volksmeinung kann ein Harnbeschauer aus dem Urin Alter, Geschlecht, Krankheitssitz und selbst die Todesstunde herausdiagnostizieren. Eine große Rolle spielte und spielt auch jetzt noch in bäuerlichen Kreisen die Harnbeschau bei der Erkennung einer Schwangerschaft. Da heißt es in einem Büchlein der volkstümlichen Harnkunde:[5] Wenn der

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[4] Ägydius von Corbeil, De urinarum judiciis (Ende des 12. Jahrh., Salerno).

[5] Nach Hovorka und Kronfeld, Vergleichende Volksmedizin II., 140, Stuttgart 1909, Strecker und Schröder.

Urin klar und licht wird und scheint als ein Pfauenspiegel oder Enterichhals schillernd und erscheint ein Antlitz in dem Harn wie in einem Spiegel, das bedeutet, daß die Frau ist schwanger worden. Auf den ersten Blick erscheint dies als ein barer Unsinn. Betrachten wir jedoch eine größere Zahl von Schwangeren-Harnen, so finden wir unter ihnen nicht wenige, welche beim Stehen an der Oberfläche die sogenannten Newton'schen Farbenringe zeigen, jenes herrliche Farbenspiel, das wir häufig auch auf der Gasse nach Regengüssen sehen. Diese Newton'schen Farbenringe schillern in der Tat wie ein Pfauenspiegel oder Enterichhals; sie entstehen durch Lichtbrechung, wenn an der Oberfläche einer Flüssigkeit eine dünne andersartige Schichte von Stoffen sich abscheidet. Unter den pathologischen Harnen finden wir dieses eigenartige Farbenspiel besonders bei schwach alkalischen Harnen, an deren Oberfläche sich eine dünne Schichte von Kalk- und Magnesiumsalzen abgeschieden hat. Das Alkalischwerden des Harnes ist aber in innigem Zusammenhang mit dem Erbrechen der Schwangeren, bei welchem der salzsaure Magensaft dem Körper verlorengeht, wodurch dann der Harn seine normal saure Reaktion verliert und die erwähnten Salze sich an seiner Oberfläche abscheiden. Ich habe dieses Beispiel etwas ausführlicher erörtert, um zu zeigen, daß uns für viele Lehren der Harnschau das Verständnis mangelt, weil wir eben nicht mehr so beobachten, wie man es früher getan hat, daß aber die eingehendere Beschäftigung mit dem Gegenstande uns auch diese Sprache wieder verstehen lehrt.

Der Kampf um den Wert oder Nichtwert der Harnschau tobte im Mittelalter allenthalben. Die sogenannten Harnseher oder Pißpropheten haben diese Kunst oft ganz heruntergebracht, indem sie alles aus dem Urin erkennen wollten; die Uroskopie als ein wertvoller Zweig der medizinischen Kunst artete in die Uromantie aus. Wie wichtig aber die Harnbeschau für die früheren Ärzte war, davon legt schon die Tatsache Zeugnis ab, daß uns allein etwa 2000 Werke über den Harn, zum Teil nur noch handschriftlich aus dieser Zeit erhalten sind. Diese Werke spiegeln schon manchmal in ihrem Titel die Eigenart des Inhaltes wieder. So wenn der Titel eines 1706 erschienenen Buches heißt: „Kurios Urin- und Hausarzneibüchlein, das ist gründlicher Unterricht, die Urine oder Wasser der Kranken zu besehen, davon judizieren, sich darin präservieren und zu kurieren." Der Titel eines anderen Werkes heißt: „Warnung wider den Harnteufel, d. i. gründlicher Unterricht von dem Urin des Menschen und sonderlich wider diejenigen, welche vorgeben, daß sie alle und jede Krankheit aus bloßer Anschauung der Urine erkennen, urteilen und kurieren wollen. Aus treuherzigem Gemüt vor die Einfältigen auf das Kürzeste verfaßt und zusammengetragen von Liphimeus." Ein sehr berühmtes Werk war das im Jahre 1696 erschienene Buch von Rivière: „Le miroir des Urines“ — „Der Harnspiegel, durch welchen man sieht und erkennt die verschiedenen Temperamente, die dominierenden Säfte und die Ursachen der Krankheiten eines jeden.“ In diesem Buche werden 26 verschiedene Harnfarben unterschieden, deren jede für einen besonderen Krankheitszustand, beziehungsweise für ein besonderes Temperament charakteristisch sein sollte. Demgegenüber klingt es wie donnernder Unwille aus einem Werk von Rappard-Magdeburg 1743: „Über die Notwendigkeit, den Mißbrauch der Uromantie und Uroskopie auszurotten.“ Gegen den Mißbrauch der Uroskopie wettert auch schon Cordus in einem 1543 zu Frankfurt erschienenen Werk: „De urinis, d. i. von rechter Besichtigung des Harns und ihrem Mißbrauch. Er will darin eine treue Warnung geben, vor dem Trug des Harnsehens bei den verlaufenen Landstreichern. Cordus ist aber selbst ein Anhänger der Harnschau, nur dringt er auf Exaktheit bei der Feststellung der Eigenschaften des Harnes. Das Gefäß, in welchem er untersucht wird, soll ganz rein sein. Der Harn darf nicht zu lange zuvor gelassen sein, nicht in Frost oder Hitze gestanden haben und nicht zu viel geschüttelt werden. Der Kranke darf nicht vorher eine Arznei genommen haben, welche die Harnbeschaffenheit und Farbe beeinflußt. Ganz modern mutet uns seine Forderung an: Übrigens soll man aus dem Harn nie allein, ohne die übliche Untersuchung des Kranken, seine Leiden beurteilen wollen. Hornung schrieb 1611 ein Buch: „Kurzer Bericht von dem unvollkommenen und betrüglichen Urteil des menschlichen Borns oder Harns; wieder eitelvermessene Ärzte, welche allerlei Leibesschwächen daraus zu erkennen sich fälschlich auftun, und damit dem Patienten schaden. Aus Liebe der Wahrheit, aus Haß des Betruges in etlichen unterschiedlichen Fragen verfaßt.“ Im Jahre 1775 schrieb ein gewisser Tichy in Prag ein Buch: Zeichen des Krankheitsausganges“, in welchem aber schon mikro- Zeichen des Krankheitsausganges, in welchem aber schon mikroskopische Bilder der Harnsedimente vorkommen.

Fragen wir uns nun, wie stellt sich die moderne Medizin zur Harnschau? Der Arzt hat heute zweifellos die Fähigkeit verloren, aus dem Gesamtbilde des Harns weitergehende Schlüsse zu ziehen. An die Stelle der Gesamtbetrachtung des Harns ist in der Gegenwart mehr ein analysierendes Betrachten getreten, und der Arzt sucht nach einzelnen Reaktionen des Harns, welche ihm diagnostische oder prognostische Hinweise geben können. Er untersucht den Harn auf Eiweiß oder Zucker, um die bekanntesten Einzelreaktionen anzuführen, aber er versäumt es, beziehungsweise versteht es nicht, die verschiedenen einzelnen Reaktionen des Harns zu einem Gesamtbilde zusammenzufassen und dieses Bild in das übrige, bunte Mosaik des Krankheitsgeschehens als eigenen Baustein einzufügen.

Diesem Mangel sucht jene Untersuchungsart abzuhelfen, welche ich im Verlaufe einer fast 30jährigen Beschäftigung mit dem Gegenstand ausgebaut habe. Ich bezeichne sie als „pathochemische Harndiagnostik". Sie strebt an, die krankhaften Vorgänge im Körper an der Hand der im Harn nachweisbaren Veränderungen zu verfolgen und ist eine klinische Untersuchungsmethode, welche in erster Linie dem Arzt vorbehalten ist. Sie setzt voraus, daß der gesunde Mensch einen anderen Harn ausscheidet, als der kranke. Dies ist in der Tat der Fall. Ansätze zu dieser Betrachtungsweise finden wir in der Uroskopie allenthalben. So schon in dem zitierten Satz des Hippokrates. „Der Urin des gesunden Menschen ist von mittlerer Konsistenz, von gelber bis crocusgelber Farbe", sagt Theophilus. Ein Anonymus[6]) aus dem 15. Jahrhundert sagt: „Ein zitronen- oder nahezu zitronengelber Urin, der mittelmäßig klar ist, zeigt einen gesunden Menschen von sanguinischem Temperament an; ein Urin, so weißlich wie das Eierklar, zeigt einen Melancholiker an; ein Harn, der licht am Morgen, rot vor dem Essen und wieder licht nach dem Essen ist, zeigt einen gesunden Menschen an." Es gibt kaum eine die Gesundheit oder das Leben des Menschen irgendwie bedrohende Krankheit, die sich nicht im Harn äußern würde. Allerdings dürfen wir uns zur Beurteilung dieser Fragen nicht mit den üblichen, schematischen Untersuchungen der heutigen Medizin begnügen, welche in der Regel nicht mehr von Ärzten, sondern von, der unmittelbaren Krankheitsbeobachtung fernerstehenden Personen vorgenommen werden, sondern müssen tiefer in die Veränderungen des Harns einzudringen trachten.

Nach den Lehren der alten Medizin lassen sich die Grundeigenschaften eines jeden Harnes nach drei Gesichtspunkten ordnen: Nach Farbe (color), Konsistenz (substantia) und Inhalt (contenta). Das Erste, was an jedem Harn auffällt, ist seine Farbe, welche vom lichtesten Strohgelb bis zu tiefem Schwarz wechseln kann. Die Farbe des Harns wurde früher als einheitlich angesehen und man hat eine Skala der Harnfarben von 1—10 aufgestellt, von denen jede nächste doppelt so stark gefärbt sein sollte, als die vorhergehende. Es ist jedoch einleuchtend, daß man hier einen Fehler beging; denn, wenn wir Zitronengelb auch hundertfach verstärken, wird daraus noch immer nicht Schwarz. Die Lehre von dem Vorherrschen eines Grundfarbstoffes im Harn, des sogenannten normalen gelben Harnfarbstoffs oder Urochroms war bis zu Anfang dieses Jahrhunderts in der physiologischen Chemie vorherrschend, bis ich den Nachweis erbrachte, daß die Harnfarbe kein einfaches, sondern ein sehr komplexes Phänomen ist, an welchem sich viele Farbstoffe und Farbstoffbildner, sogenannte Chromogene, beteiligen. Eines dieser Chromogene habe ich näher charakterisiert und als Ursache der Ehrlich'schen Diazo-Reaktion beschrieben und hat dasselbe in der medizinischen Literatur unter dem Namen Urochromogen seinen Platz gefunden. Es spielt jedoch unter normalen Verhältnissen keine Rolle, sondern erst bei krankhaften Störungen des Stoffwechsels.

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[6]) Pergens, Eine Urinschautafel aus Cod. Brux. Nr. 5876, Arch. f. Gesch. d. Med. I, 398, 1908.

Die normale Harnfarbe [7]) ist gelb bis bräunlich und hat viele Nuancen. Das Gelb kann bis zu Zitronengelb und das Braun bis ins Rötliche gehen. Eine mittlere Farbe stellt das sogenannte Bernsteingelb vor, welches gewöhnlich als normale Harnfarbe angesehen wird. Die alten Ärzte haben dreierlei Harnarten unterschieden, in welchen die Farbstoffe verschiedenartig hervortreten können: 1. den Harn des Blutes (Urina sanguis), der am Morgen gelassen wird, 2. den Harn nach der Hauptmahlzeit (Urina chyli) und 3. den Harn nach reichlichem Trinken (Urina potus). Sie verlangen, daß man den Morgenharn untersuche, weil er von den Einflüssen, die sich in den späteren Tageszeiten geltend machen, also vor allem Aufnahme von Speise und Trank, noch frei ist. Diesen Standpunkt müssen wir vorbehaltlos annehmen und gilt dies auch inbesondere für die Beurteilung der Harnfärbung. Harne von Nachmittag sind, wenn nicht zuviel getrunken wird, immer etwas rötlicher als Frühharne, weil beim Essen die reichliche Absonderung der Galle mit den in ihr enthaltenen Farbstoffen zu einer Farbenzunahme des Harns, besonders wenn er im Licht gestanden ist, Anlaß gibt. Wir kennen die sogenannte Verdauungs-Urobilinurie, [8]) welche auf diese Weise entsteht und zur Ausscheidung von deutlichen Mengen Urobilins, beziehungsweise Urobilinogens führen kann. Auch können aus den Nahrungsmitteln stammende Farbstoffe, wie zum Beispiel aus den Karotten oder roten Rüben, die Harnfarbe beeinflussen. Anderseits kann eine zu reichliche Flüssigkeitsaufnahme während und nach dem Essen den Harn so stark verdünnen, daß die ihm zukommende Farbe völlig verwischt wird.

Das genauere Studium auch der normalen Harnfarbe hat gezeigt, daß sich an ihr mehrere Farbstoffe beteiligen, welche jedoch quantitativ verschieden gemengt vorkommen. Ich habe die Harnfarbstoffe in eine Gruppe der roten und in eine Gruppe der gelben eingeteilt. Zur Gruppe der roten Harnfarbstoffe, die sich schon normalerweise bis zu $^2/_5$ an der Harnfarbe beteiligen, gehören vor allem zwei Farbstoffe, denen wir in der Pathologie des Harns wieder begegnen werden. Der eine ist das Uroerythrin, welches in stärkerer Konzentration orange bis feuerrot, in schwächerer gelblich ist. Dies ist jener Farbstoff, der an Harnsäure gebunden, den sogenannten Ziegelmehlniederschlag oder das sedimentum latericium der alten Ärzte bildet, welches namentlich in Fieberharnen leicht ausfällt, aber auch schon normal bei stärkerer Abkühlung wie im Winter, in geringer Menge von selbst ausfallen kann. Der zweite zur roten Gruppe gehörende Harnfarbstoff ist das Urobilin. Es ist erst bei saurer Reaktion rot, bei neutraler aber nur rotgelb. Dieser Farbstoff ist im frischen Harn noch nicht enthalten, sondern findet sich in ihm nur als farbloses Chromogen. Erst durch Licht- und Säurewirkung entsteht aus ihm der rote Farbstoff Urobilin. Die Umwandlung des farblosen Urobilinogens in das gefärbte Urobilin ist die Ursache, daß lichte Harne beim Stehen braun bis rötlich werden. Gleichzeitig mit dieser Umwandlung treten im Harn oder in Lösungen dieses Farbstoffs zwei Farbenphänomene auf, von welchen wir das eine schon makroskopisch beobachten können: der Harn bekommt die Fähigkeit der Fluoreszenz, besonders beim Zusatz von Metallsalzen und Alkali; das Zweite ist das Auftreten eines scharfen Bandes im Spektrum.

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[7]) Weiss, Die Harnfarbe und ihre spektrale Analyse. Deutsch. Arch. f. klin. Med. **166**, 331, 1930. — Die Harnfarbe und ihre Zusammensetzung. Klin. Wochenschr. 1932, Nr. 44.

[8]) Weiss, Wiener Arch. f. innere Med. **20**, 1930.

Die spektroskopische Untersuchung ist eine wichtige Methode zur Eruierung und zur Bestimmung der Harnfarbstoffe. Stellt man sich die sieben Regenbogenfarben nebeneinander als Band vor, wie es von den meisten Spektroskopen entworfen wird, so gehen normalerweise, das heißt bei der Betrachtung des Tageslichts durch das Spektroskop die Farben gleichmäßig ohne deutliche Unterbrechung ineinander über. Halten wir aber zwischen Lichtquelle und das mit dem Spektroskop bewaffnete Auge eine klare, gefärbte Flüssigkeit, so zeigen die meisten derselben charakteristische Auslöschungen, so daß die Kontinuität des Regenbogenspektrums durch schwarze Bänder unterbrochen ist. Solche Bänder befinden sich, je nach dem untersuchten Farbstoff, einmal im Rot oder Gelb, im Grün oder Blau, und ihre Lage ist so charakteristisch, daß man danach sagen kann, was für ein Farbstoff vorhanden ist. Dies ist die sogenannte spektrale Analyse der Farbstoffe. Die Eigenschaft der besonderen Absorptionsfähigkeit der Farbstoffe im allgemeinen, der Harnfarbstoffe im besonderen, welche auch parallel geht dem Konzentrationsgrad des Farbstoffs, habe ich der Konstruktion eines eigenen Apparates zugrunde gelegt, des Spektrometers (Abb. 6), welches unter Zuhilfenahme einiger nicht schwieriger Extraktionen oder Fällungen die allermeisten Harnfarbstoffe auch quantitativ zu bestimmen erlaubt.⁹) Auf diese Weise wurde festgestellt, daß die Menge der beiden erwähnten Farbstoffe im normalen Harn nur gering ist, daß sie aber unter pathologischen Verhältnissen bedeutend ansteigt.

Zur Gruppe der roten Harnfarbstoffe gehören noch mehrere

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⁹) Zu beziehen durch Hellige u. Comp., Freiburg im Breisgau.

andere Farbstoffe, von welchen das Porphyrin, beziehungsweise Kopro- und Uroporphyrin Beziehungen zum Blutfarbstoffumsatz besitzt, ein anderer den Namen Urorubin[10]) führt. Dieser letztere, von mir im Harn von Diabetikern entdeckte Farbstoff ist darum von Wichtigkeit, weil seine Feststellung häufig einen Hinweis darauf enthält, daß der Zuckerstoffwechsel im Organismus gestört ist.

Wenn auch schon nicht mehr der Farbe nach, aber doch nach den sonstigen Eigenschaften, wie insbesondere der Fällungsmöglichkeit durch Ammoniumsulfat und der besonderen Extrahierbarkeit durch Amylalkohol, gehört in diese Gruppe der Gallenfarbstoff, der keine scharfe Auslöschung im Spektrum, sondern nur eine gleichmäßige Verdunkelung des blauvioletten Spektralteiles zeigt. Gallenfarbstoff kann schon normalerweise in Spuren im Harn vorkommen, seine Menge steigt aber erst unter krankhaften Verhältnissen stärker an. Durch ein besonders, von mir beschriebenes Verfahren, welches auf der Überführung des Bilirubins in sein blauviolettes Oxydationsprodukt Bilicyanin beruht, kann auch der Gallenfarbstoff einer quantitativen Bestimmung im Harn zugeführt werden.[11])

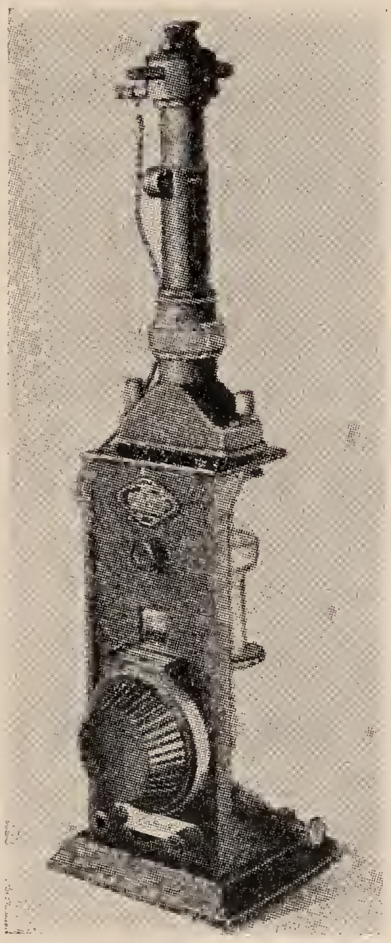

Abb. 6. Das Spektrometer.

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[10]) Klin. Wochenschr. 1930, Nr. 6.

[11]) K. Franke, Hautfarbe und Uringallenfarbstoffe beim Ikterus. Zeitschr. f. d. ges. exp. Med. **79**, 107, 1931.

In der Gruppe der gelben Harnfarbstoffe kennen wir weit weniger Repräsentanten als in der roten. Hierher gehört jener Farbstoff, dem man früher den Hauptanteil an der Harnfärbung zugeschrieben hat, das Urochrom, welches im reinen Zustand ausgesprochen grüngelb gefärbt ist. Weiterhin ein ähnlich gefärbtes, aber mit ihm nicht identisches Chromogen, das schon erwähnte Urochromogen, welches durch die Kaliumpermanganat-Reaktion nachgewiesen wird, und ferner das beim Melanosarkom vorkommende, sich durch Oxydationsmittel braunschwarz färbende Melanogen. Auch für diesen Körper, sowie ein ähnliches bei Karbolvergiftungen vorkommendes Chromogen habe ich eine Methode des Nachweises angegeben, welche auf der Rosafärbung bei Zusatz des Ehrlich'schen Diazoreagenz schon bei saurer Reaktion beruht.[12] Es ist jedoch wahrscheinlich, daß in der Gruppe der gelben Farbstoffe noch Chromogene anderer Art enthalten sind, die vielleicht zum Stoffwechsel der Nebenniere in Beziehung stehen. Vorläufig entziehen sich dieselben aber einer genauen Charakterisierung.

Was wir jedoch von den Harnfarbstoffen wissen, genügt, um dieselben mit Nutzen in das Krankheitsgeschehen einzubeziehen. Wir wissen seit jeher, daß der Fieberharn in der Regel rot ist. Es hat nicht an Stimmen gefehlt, welche behauptet haben, daß der Fieberharn schon darum rot ist, weil er durch Wasserverlust des Körpers sich konzentriere. Dies ist sicher falsch. Der Fieberharn ist darum röter, als der normale Harn, weil vor allem die Farbstoffe der roten Gruppe vermehrt ausgeschieden werden, unter ihnen wieder in erster Reihe jene beiden Farbstoffe, die wir schon vom normalen Harn her kennen: das orangerote Uroerythrin und das im Licht rotwerdende Urobilinogen.

Warum werden jedoch diese Farbstoffe vermehrt ausgeschieden? Die Ursache liegt in der außerordentlich leichten Alteration der Zirkulationsverhältnisse des Blutes und der Galle in der Leber durch den fieberhaften Prozeß. Die Leber ist ein Bildungs- und Sammelorgan für im Organismus entstandene oder ihm von außerhalb zugeführte Farbstoffe. Die Leber scheidet diese Farbstoffe in die Gallenblase aus und von hier gelangen sie in den Darm, wo sie mit den Exkrementen zum Teil unverändert abgegeben, zum Teil aber auch chemisch verändert werden. Das gilt besonders vom Gallenfarbstoff, dem Abbauprodukt der roten Blutkörperchen. Durch die reduzierende Wirkung der Bakterien im Darm wird das Bilirubin in eine Leukobase, das Urobilinogen, umgewandelt und zum größten Teil als wertlose Schlacke des Körpers mit dem Stuhl ausgeschieden. Ein kleiner Teil desselben wird aber vom Darm aus mit den Nahrungssäften aufgesogen, gelangt in das Abfangeorgan für die Farbstoffe, in die Leber, und wird von dieser zugleich mit dem Gallenfarbstoff an die Gallenblase abgegeben. Es existiert daher ein normaler Urobilinogenstrom vom Darm — via Leber und Gallenblase — zurück in den Darm. Normalerweise gelangen nur kleinste Mengen aus dem Urobilinogenstrom mit dem Lebervenenblut in den großen Kreislauf und durch die Nieren in den Harn. In dem Augenblick aber, wo, wie bei den fieberhaften Erkrankungen die ohnehin nur unter einem kleinen Druck arbeitende Strömung in den Gallengängen leidet, treten Abwegigkeiten (Paracholien) dieses Farbstoffes auf, und er gelangt in größerer Quantität statt in die Gallenblase in den Harn und wird hier in frischem Zustande relativ leicht nachweisbar durch die von Ehrlich angegebene Aldehydreaktion oder, wegen der leichten Beeinflußbarkeit der letzteren durch fremde Stoffe sicherer nach dem Stehen im Licht oder nach Behandlung mit einem Oxydationsmittel — zum Beispiel dem von mir angegebenen Chromogenreagenz — bei saurer Reaktion durch sein spektroskopisches Verhalten.

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[12] M. Weiss, Neuere Harnuntersuchungsmethoden und ihre klin. Bedeutung. J. Springer, Berlin, 1922.

Umgekehrt verschwindet aber das Urobilinogen aus dem Harn vollständig, wenn, wie beim totalen Verschluß der Gallenwege kein Gallenfarbstoff mehr in den Darm gelangen und hier sich naturgemäß auch kein Urobilinogen mehr bilden kann. Dieser Farbstoff ist für uns daher ein sehr willkommenes Hilfsmittel, um die Durchgängigkeit der Gallenwege zu beurteilen und ist namentlich bei Gallensteinverschluß oder gewissen entzündlichen Lebererkrankungen das Wiedererscheinen der eine Zeitlang verschwunden gewesenen Urobilinogenreaktionen ein sehr willkommenes Zeichen für die Besserung.

Noch mehr als vom Urobilinogen, beziehungsweise dem aus ihm entstandenen Urobilin wird die Rotfärbung der Fieberharne bedingt durch den zweiten der schon physiologisch nachweisbaren roten Harnfarbstoffe, durch das Uroerythrin, von welchem, obzwar er der am längsten bekannte Harnfarbstoff ist, die physiologische Chemie noch gar nichts Bestimmtes weiß. Durch die Beschäftigung mit der Pathologie dieses Farbstoffes habe ich mir jedoch folgende Vorstellung gebildet: Das Uroerythrin ist ein in den Leberzellen vorhandener oder gebildeter Farbstoff, welcher normalerweise dort verbraucht oder zerstört wird. Denn in der Gallenblase oder im Stuhl finden wir diesen Farbstoff nicht. In dem Augenblick aber, wo Störungen im Leberkreislauf einsetzen, werden größere Mengen dieses Farbstoffes aus den Leberzellen ausgeschwemmt und gelangen in den Harn. Daher sind die beiden Farbstoffe Uroerythrin und Urobilin zumeist, wenn auch nicht immer, vergesellschaftet miteinander zu finden. Der für Zirkulationsänderungen in der Leber empfindlichere von den beiden Farbstoffen ist jedoch das nach meiner Theorie dem Kreislauf in der Leber näherstehende Uroerythrin, welches auch bei plötzlichem Verschluß der Gallenwege, zum Beispiel durch Gallensteine auch ohne besondere Urobilinvermehrung im Harn gefunden werden kann.

Fragen wir uns aber nach dem ersten Anlaß dieser Störung in der Leberzirkulation, welche ihrerseits die Farbstoffe von ihrem normalen Weg in die Gallenblase gegen den großen Kreislauf zu und in die Nieren abdrängt, so müssen wir in erster Linie eine Schädigung der normalen Herztätigkeit als Ursache beschuldigen. Diese Schädigung braucht sich im Allgemeinbefinden noch nicht besonders zu äußern und kann dabei doch schon auf die Blut- und Gallenströmung in der Leber wirken. Schon eine leichte Herabsetzung der vis a tergo vom Herzen kann zu einer Stauung in der Leber führen und bei Steigerungen der Herzalteration nehmen auch die Erscheinungen des gestörten Leberkreislaufs zu und kann es auch zur Ausscheidung des dritten, mit der Leber in Beziehung stehenden Farbstoffs, des Gallenfarbstoffs, seltener des vierten Farbstoffs dieser Art, des Porphyrins, in den Harn kommen. Alle diese Erscheinungen der Abdrängung der Farbstoffe gegen den großen Kreislauf können daher von vornherein bei Herzfehlern auch ohne Fieber vorhanden sein und gehört die Abscheidung eines roten Harnes zu den charakteristischen Begleitphänomen jener unausgeglichenen Herzfehler, die zu einer Leberstauung führen, während andere, wie namentlich Aortenvitien, die zu keiner solchen Stauung Anlaß zu geben pflegen, diese Farbänderung des Harnes vermissen lassen.

Gesellt sich zur Alteration des Herzens bei einem Fieber auch noch eine Lungenschädigung, so kommt als neue Ursache der Störung des Leberkreislaufs außer der Rückwirkung auf das Herz durch die Lungenerkrankung, noch häufig eine unmittelbare Schädigung der Lungenatmung hinzu. Bei der Einatmung wird das Leberblut durch das Tiefertreten der Lungen und des Zwerchfells ausgepreßt. Entfällt diese Förderung der Leberzirkulation, so muß auch aus diesem Grunde eine Neigung zur Stauung in der Leber die Folge sein. Lungeninfarkte können durch heftigen Schmerz eine Lunge aus der Atmung fast ganz ausschalten. Dasselbe kann bei einer Rippenfellentzündung oder Rippenfellreizung eintreten. In beiden Fällen können wir sehr starke Farbstoffausscheidung im Harn finden, welche aber nach einer uralten Erfahrung ihren Höhepunkt in der Regel bei der Lungenentzündung erreicht. Beginnende Lungenaffektionen auch relativ leichter Art, bei welchen der Ausgleich, der sonst später wie zum Beispiel bei der Lungentuberkulose, zumeist erfolgt, noch nicht eingesetzt hat, pflegen sehr starke Uroerythrinausscheidung zu bewirken, ähnlich wie dies beim plötzlich entstandenen Gallensteinverschluß der Fall ist. Die alten Ärzte haben derartige, besonders uroerythrinreiche und daher flammendrote Harne als Urina flammea bezeichnet.

Es gibt daher in der Ausscheidung der roten Harnfarbstoffe, die als charakteristisch für Fieber gilt, mannigfache Beziehungen zu den ohne Fieber einhergehenden Herzfehlern, zur Gallensteinkrankheit und naturgemäß auch zu Leberkrankheiten selbst. Denn wenn die Leber schon indirekt die Ursache zu so starker Farbstoffabscheidung in den Harn ist, so ist es begreiflich, daß der Effekt einer direkten Schädigung derselben durch die enorm große Zahl von Erkrankungsmöglichkeiten des Organs selbst sowie der Blut- und Gallenwege desselben noch größer sein kann.

Wir haben aber noch mit einer weiteren Quelle vermehrter Farbstoffausscheidung im Harn zu rechnen, welche unabhängig von der Leber sein kann und daher oft nur einseitig den einen der beiden Farbstoffe, das Urobilin betrifft. Bei perniziöser Anämie, wo manchmal zehnmal so viel rote Blutkörperchen als normal zerstört werden, wo dementsprechend auch die 10 mal größere Gallenfarbstoffmenge in den Darm kommt und daher auch weit größere Urobilinogenmengen aus dem Gallenfarbstoff gebildet werden und in den geschilderten Kreislauf gelangen, ist die Möglichkeit gegeben, daß die normal sehr geringfügige Urobilinausscheidung im Harn bis zu deutlich nachweisbaren Quantitäten ansteigt, die dann besonders im Morgenharn auffallen, weil dieser im Gegensatz zum Nachmittagsharn zumeist kaum nachweisbare Urobilinspuren enthält.

Die vermehrte Ausscheidung der roten Harnfarbstoffe darf daher nur als ein sehr allgemeines Symptom verwertet werden, welches bei einer ungeheuren Zahl von fieberhaften und nichtfieberhaften Krankheiten vorkommt und an sich für keine Krankheit charakteristisch ist. Ja, es ist sogar begreiflich, daß ein Fieber, welches sehr wenig auf das Herz und die Lunge zurückwirkt, nicht einmal zu einer besonderen Vermehrung der Farbstoffe im Harn zu führen braucht, wie gegenüber einer in der letzten Zeit von Freund[13]) geäußerten Ansicht betont werden muß, nach welcher Fehlen von Rotfärbung im Harn Fieber mit Sicherheit ausschließen läßt. Auch müssen wir uns in allen derartigen Fällen hüten, eine Nierenerkrankung zu übersehen, bei der nebst anderen auch die Ausscheidung der Harnfarbstoffe behindert sein kann.

Ich habe der Besprechung der roten Harnfärbung hier einen größeren Platz eingeräumt, weil wir ihr in der Pathochemie des Harnes auf Schritt und Tritt begegnen und eine erfolgreiche Anwendung der pathochemischen Diagnostik am Krankenbett ohne diese Kenntnisse ganz aussichtslos wäre. Wir wollen uns gleich dem gegenteiligen Bilde, dem blassen, also besonders farbstoffarmen Harn zuwenden. Die Ursache für die Blässe eines Harnes kann zunächst einmal darin liegen, daß er infolge stärkerer Flüssigkeitsaufnahme, wie bei reichlichem Trinken, verdünnt sein kann. Dies erkennen wir durch die Messung des spezifischen Gewichts, welches normalerweise zwischen 1020 bis 1030 bei der durchschnittlichen Tagesmenge von etwa 900 bis 1500 schwankt, in diesen Fällen aber bis zu 1002 heruntergehen kann. In einem gewissen Gegensatz zu diesen, durch bloße Flüssigkeitsaufnahme im Organismus verdünnten Harn, steht ein sehr blasser Harn, der bei schweren Nierenleiden ausgeschieden wird, und dessen Farbstoffarmut durch die Unfähigkeit der Niere zur Farbstoffausscheidung entsteht. Bei diesen Harnen ist das spezifische Gewicht gewöhnlich nicht so niedrig, wie beim Trinkerharn, aber zumeist wegen der Zurückhaltung auch anderweitiger Harnbestandteile im Blute auch nicht hoch. Die Tagesmengen solcher Harne pflegen selten über 1000 zu gehen, während bei reichlichem Trinken leicht 2—3 Liter Harn im Tage ausgeschieden werden. Außer diesen, durch Bestimmung der Harntagesmengen feststellbaren Eigentümlichkeiten zeigt der Harn bei Niereninsuffizienz zumeist auch Eiweiß und bei der mikroskopischen Untersuchung des Harnsediments gewöhnlich auch Harnzylinder.

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[13]) Wiener klin. Wochenschr. 1934, Nr. 1.

Die Messung des spezifischen Gewichtes, welche der Arzt heute fast niemals mehr selbst vornimmt, sondern dem Krankenpersonal überläßt, gibt uns auch bei einem anderen blassen und in größerer Menge ausgeschiedenen Harn sofort einen Hinweis auf einen besonderen, krankhaften Prozeß, bei der Zuckerkrankheit. Blasse Harne mit einem spezifischen Gewicht von 1020 und darüber, zeigen in der Regel die Anwesenheit von Zucker an, dessen Nachweis, wenn man daran denkt, sehr leicht ist. Für den Praktiker habe ich ein bequemes Trockenreagens für den qualitativen und quantitativen Zuckernachweis im Harn im sogenannten „Glykostat“[14]) hergestellt.

Die blasse Färbung des Harns spielt aber auch noch bei anderen Krankheitszuständen eine Rolle, welche in das Gebiet der nervösen und spastischen Krankheiten fallen. Die alten, und zum Teil auch die heutigen Ärzte kennen eine sogenannte Urina spastica, ein Harn, der bei einem relativ nicht allzu niedrigen spezifischen Gewicht — etwa um 1010 herum — auffallend blaß ist, zumeist reichlich Phosphate enthält und der wahrscheinlich analog dem Harn bei schweren Nierenleiden durch Zurückhaltung der Farbstoffe im Blut entsteht, nur mit dem Unterschied, daß dieser Zustand bei Nierenkranken dauernd, bei diesen spastischen Zuständen aber vorübergehend ist. Solche spastische Harne beobachten wir auch bei Hysterie und Herzbräune, manchmal während der Malariafröste und in den ersten Tagen bei vielen, auch gutartig verlaufenden Vergiftungen. Blasse Harne, in der Regel zusammen mit niedrigem spezifischen Gewicht, finden wir auch in der Rekonvaleszenz nach schweren Krankheiten und sehr häufig bei Menschen, welche wenig essen, und ist die Beachtung dieser Verhältnisse von großem Wert zur Beurteilung, ob ein Leiden vorliegt, das die Nahrungsaufnahme, respektive den Stoffumsatz unmittelbar schädigt. Solche Harne sehen wir häufig beim Magenkrebs. Die Blässe dieser Harne entsteht aus einer anderen Ursache als bei den Rekonvaleszenten. Die Letzteren setzen jene Stoffe, aus welchen sonst der gelbe Harnfarbstoff gebildet wird, stärker an und scheiden deshalb weniger Urochrom aus, die ersteren aber nehmen die Stoffe, aus welchen das Urochrom gebildet wird, in geringerer Menge auf oder verarbeiten sie schlechter. Denn wie noch nicht veröffentlichte Untersuchungen aus der letzten Zeit ergeben haben, ist das Bildungsmaterial des gelben Harnfarbstoffes oder Urochroms das Nahrungseiweiß selbst. Die genauere Bestimmung des Urochroms nach den von mir angegebenen Methoden[15]) erlaubt diese Verhältnisse auch quantitativ auszudrücken.

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[14]) Zu beziehen durch R. Siebert, Wien, IX., Garnisongasse 9.

Die Harnfärbung kann jedoch auch bei krankhaften Zuständen mit relativ geringer Nahrungsaufnahme dann verstärkt sein, wenn Eigenabbau des Organgewebes unter besonderen Bedingungen hinzukommt. Dann wird der von mir beschriebene gelbe Harnfarbstoff, das Urochromogen, ausgeschieden, welches dem Harn eine sattgelbe Färbung verleiht. Aus der Färbung allein können wir aber die Anwesenheit dieses Körpers nicht erschließen. Wir haben zum Glück in der von Ehrlich angegebenen Diazoreaktion, sowie in der von mir beschriebenenen Permanganatprobe[16]) ein Mittel, die Anwesenheit dieses Chromogens zu erschließen. Beide Reaktionen, von welchen die letztere die empfindlichere und einfachere ist, sind sehr charakteristisch und haben in der pathochemischen Diagnostik eine große Bedeutung. Wir können Urochromogen bei sehr vielen fieberhaften Krankheiten finden, aber typisch ist dasselbe für Typhus und die fortschreitende Lungen- oder chirurgische Tuberkulose. Die Urochromogenreaktion hat sich namentlich während des Krieges bei der Auslese der vielen fieberhaften Erkrankungen bewährt, und in der Prognosestellung der Tuberkulose spielt die Probe eine große Rolle für die Frage, ob man mit dem konservativen Verfahren, wie Heilstätte, Fixationsverbände u. dgl. noch auskommt, oder ob man radikalere Methoden, wie Pneumothorax oder andere operative Verfahren anwenden muß. Die Urochromogenprobe ist bei jeder Krankheit ein ernstes Symptom und kann auch insbesondere bei älteren, nichtfiebernden Personen auf ein Neugebilde der inneren Organe hinweisen. Die differentialdiagnostische Verwertung dieser Probe ist heute Gemeingut der Medizin.

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[15]) Siehe Enger und Preuschoff, Harnfarbstoffausscheidung und Nierenfunktion. Deutsch. Arch. f. klin. Med. **175**, 185, 1933.

[16]) Für die Permanganatprobe kann auch ein Trocken-Reagens verwendet werden, welches unter dem Namen „Chromogen-Reagens" durch die Österr. Heilmittelstelle", Wien, III., zu beziehen ist.

Zu den Harnfarbstoffen im weiteren Sinne gehören Körper, welche bei der Fäulnis im Darm, beziehungsweise in der Leber entstehen und von hier in den Harn gelangen. Sie sind von Haus aus ungefärbt, haben jedoch die Fähigkeit, bei Behandlung mit besonderen Oxydationsmitteln sich in ausgesprochene Farbstoffe umzuwandeln, die ein deutliches Absorptionsband zeigen und daher auch einer quantitativen Bestimmung mittels des Spektrometers zugänglich sind. Am längsten bekannt unter den Fäulniskörpern des Harns ist das Indikan. Leider ist das Indikan auch der einzige derartige Körper, mit welchem die Klinik arbeitet, obzwar es noch andere Substanzen dieser Art gibt. Ich habe schon im Jahre 1911 darauf hingewiesen, daß außer dem Indigofarbstoff auch der prachtvoll rote Farbstoff, der den Namen Urorosein führt, für die Beurteilung der Darmfäulnis eine große Rolle spielt und habe mit meinem damaligen Mitarbeiter Smieczuszewski[17]) eine einfache Uroroseinprobe für den Harn ausgearbeitet und betont, wie häufig dieser Farbstoff beim Krebs des Magen-Darmtraktes vorkommt. Das Indikan und Urorosein treten seltener gleichzeitig, häufiger abwechselnd miteinander auf.

Die pathochemische Bedeutung des Uroroseins ist genau die gleiche, wie die des Indikans und die Kenntnis dieses Körpers, der auch aus einem farblosen Indolderivat, der Indolazetursäure, hervorgeht, ist geeignet, eine der fühlbarsten Lücken in der Diagnostik der Magen-Darmkrankheiten auszufüllen. Dem Arzt, der nur auf Indikan den Harn untersucht, entgeht dieses zweite, außerordentlich häufige Fäulnissymptom im Harn vollständig. In die Reihe der Fäulnisreaktionen gehört auch die Thormählen'sche Probe, welche nicht, wie Eppinger[18]) meint, eine Melanogen-, sondern eine Indol-, beziehungsweise Indolcarbonsäurereaktion ist; daher vermissen wir sie vielfach bei Melanosarkomharnen, finden sie dagegen gar nicht selten bei vermehrten Fäulnisprozessen im Darm. Außer den bisher erwähnten Fäulniskörpern des Harns, welche Spaltprodukte des Tryptophans, also Indolderivate sind, haben wir auch die Möglichkeit, die Abkömmlinge eines zweiten Eiweißbausteines, des Tyrosins nachzuweisen, die sogenannten Oxydsäuren, Oxy-, Phenylessig- und Propionsäure. In der richtigen Anwendung der Millon'schen Probe liegt ein Weg des bequemen Nachweises dieser Stoffe im Harn.

Die Bedeutung einer rechtzeitigen Erkennung vermehrter

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[17]) Weiss und Smieczuszewski, Das Urorosein und seine klinische Bedeutung, Wiener klin. Wochenschr. 1911, Nr. 52.

[18]) Eppinger, Biochem. Zeitschr. **28**, 181, 1910.

Darmfäulnis durch die „pathochemische Diagnostik“ liegt 1. im frühzeitigen Hinweis auf Ausfallserscheinungen der Magenfunktion — vor allem Salzsäuremangel — und ist daher unter anderem auch für die Diagnostik der perniziösen Anämie von Wichtigkeit, 2. im Hinweis darauf, daß im Magen-Darmtrakt ein krankhafter Prozeß besteht, hinter welchem hich auch oft ein Krebs verbirgt. Die Differenzierung der verschiedenen in Betracht kommenden Zustände. welche zu einer vermehrten Darmfäulnis Anlaß geben, ist Sache der internen Diagnostik, die auch röntgenologische und Stuhlbefunde zur Klärung der Situation heranziehen wird. Die pathochemische Untersuchung leistet schon viel, wenn sie durch einige, in wenigen Sekunden ausführbare Reaktionen die Aufmerksamkeit des Arztes auf diese Vorgänge im Körper lenkt. welche, wie die experimentellen Untersuchungen von Carell und Fischer-Wasels mit Indol ergeben haben auch als disponierende Faktoren für die Entstehung des Krebses eine Rolle spielen. Auch kann die Krebsdiagnostik, wie namentlich Boas betont, vielfach nur eine Vordiagnose sein, welche die Aufmerksamkeit darauf lenkt, es könnte dieses Leiden vorliegen und jenen Verdacht erzeugt, der, wie Payr sagt, erst der Schlüssel zur Krebsdiagnose ist.

Der Vorteil dieser und anderer pathochemischer Untersuchungsmethoden liegt darin, daß sie leicht von jedem Arzt ausgeführt werden können, und daß im Zusammenhalt mit anderen verdächtigen Zeichen eine stärkere Fäulnisreaktion des Harnes die Situation oft blitzartig erhellt und weitere Untersuchungen und Beobachtungen veranlaßt, um einen Verdacht zu bestärken oder zu entkräften. Diese und andere ähnliche Harnbefunde, welche als Hinweis auf die Möglichkeit eines Krebses verwertet werden können, haben an sich keinen spezifischen Charakter. Sie sind auch nicht losgelöst vom sonstigen Krankheitsbilde zu verwerten, sondern nur im Zusammenhang mit dem klinischen Untersuchungsergebnis und anderen Harnbefunden. Sie sind jedoch kritisch verwendet, geeignet, die frühzeitige Erkennung des Magen-Darmkrebses zu erleichtern und das Schwergewicht der Karzinom-Diagnose oder Vordiagnose wieder in die Hand des praktischen Arztes zu legen. Denn wir dürfen uns nicht verhehlen, daß fast alle wirklichen oder scheinbaren Karzinomreaktionen bisher der Hand und dem Urteil des praktischen Arztes entzogen sind, und daß es außer den in der Großstadt mit allen modernen Hilfsmitteln arbeitenden Ärzten auch solche gibt, die unter primitiveren Verhältnissen zu arbeiten gezwungen sind und daher alles, was den Einblick in das Krankheitsgeschehen zu fördern imstande ist, mit Dankbarkeit begrüßen werden. Dies ist aber auch zugleich der Weg, den auch die Präventivmedizin gehen muß, für welche die frühzeitige Erkennung von Krebs und Krebsdisposition ein bisher ungelöstes Problem darstellt.

In der letzten Zeit ist es mir gelungen, auch einen neuen, einfachen Weg des Tyrosinnachweises im Harn zu finden, der für die Leberpathologie in vivo von der größten Bedeutung zu werden verspricht. Atrophien, Abszesse oder sekundäre degenerative Veränderungen der Leber im Anschluß an Gallenblasen- oder Pankreaserkrankungen rücken damit in den Bereich einer exakteren frühzeitigen Erkennungsmöglichkeit und sowohl die interne Diagnostik, wie die operative Chirurgie dürfte hierdurch eine willkommene Bereicherung ihres bisher relativ armen, diagnostischen und prognostischen Rüstzeugs bei der Beurteilung von Leber-, Gallenblasen- und Pankreaserkrankungen erfahren. Das neue Verfahren wird demnächst veröffentlicht werden.

Die pathochemische Harndiagnostik besitzt außer den bisher angeführten Hilfsmitteln noch zahlreiche andere Möglichkeiten, um das Krankheitsgeschehen zu verfolgen. Unter besonderen pathologischen Verhältnissen erscheinen im Harn relativ einfach nachweisbare Eiweißderivate, welche nicht Zeichen einer Nierenerkrankung zu sein brauchen, sondern Ausdruck einer entzündlichen oder andersartigen Infiltration der Gewebe sind. Diese Körper stehen den Abbauprodukten des Eiweiß, welche bei der Verdauung entstehen, also den Peptonen, Albumosen und Nukleoproteinen sehr nahe. Es war möglich, den Nachweis dieser Körper so zu verfeinern, daß in jedem Fall einer ernsteren entzündlichen Infiltration ein Korrelat derselben im Harn gefunden werden kann. Sie stehen mit Substanzen in Beziehung, von welchen man schon seit langem weiß, daß sie bei vielen Krankheiten vermehrt ausgeschieden werden, zu den sogenannten Oxyproteinsäuren, zum Kolloidalstickstoff und Neutralschwefel. Ähnlich wie bei den entzündlichen Erkrankungen sind auch beim Krebs, der übrigens in der letzten Zeit von Borst in München auch als Resultat einer besonderen, der krebsigen Entzündung angesehen wird, solche Abbaustoffe des Eiweiß im Harn nachweisbar, die, wenn auch nicht spezifisch auf Krebs hinweisend, doch im Zusammenhalt mit anderen Krankheitszeichen einen Verdacht bestärken oder entkräften können. Besonders auf das letztere möchte ich großen Wert legen, da die Erfahrung gelehrt hat, daß ganz gesunde Menschen keine derartigen Abbauprodukte des Eiweiß im Harn auszuscheiden pflegen, während der Nachweis derselben noch eine genauere differentialdiagnostische Beurteilung notwendig macht. Auch diese Untersuchungsmethoden, mit deren Ausbau ich noch beschäftigt bin, dürften berufen erscheinen, der Präventivmedizin die noch fehlenden Grundlagen für die Beurteilung von Gesundheit und Krankheit zu geben.

Aber auch physiologische Vorkommnisse, wie die Schwangerschaft verändern den Harn. Die Verfolgung der von Voge angegebenen, von Kapeller-Adler wieder genauer geprüften vermehrten Histidinausscheidung im Harne Gravider durch mich hat zu einer relativ einfachen Schwangerschaftsprobe geführt, die auch der praktische Arzt leicht in wenigen Minuten ausführen kann. Fügt man zu 10 cm^3 Harn in einer besonderen Schüttelbürette [19]) zirka 5 cm^3 einer 2·5 %igen Bromeisessiglösung, [20]) mischt 2—3 mal um, so wird ein Teil des Broms gebunden, ein anderer Teil bleibt frei. Der freie Anteil, der die Histidinreaktion stören würde, wird durch 2—3 maliges Ausschütten mittels je 3 cm^3 Chloroform entfernt. Ist das zuletzt abgelassene Chloroform nurmehr gelblich, so gießen wir von dem so behandelten Harn etwa 6 cm^3 in eine Eprouvette und fügen 3 cm^3 der von Kapeller-Adler angegebenen Alkalimischung [21]) hinzu. Wir teilen den Inhalt der Eprouvette in zwei Hälften. Die eine wird über einer Spiritusflamme leicht erwärmt, bis sie sich heiß anfühlt, aber nicht aufkocht. Häufig tritt die charakteristische Brom-Histidinreaktion schon in der Kälte gleich nach dem Zugießen der Alkalimischung auf. Sie besteht in einer schmutzig blauvioletten Färbung, welche sich in der erwärmten Probe allmählich vertieft, aber auch in der kalt gebliebenen nach etwa einer halben Stunde sehr deutlich zu sehen ist. Bei negativen Reaktionen tritt höchstens eine leicht bräunlich-rötliche Farbenänderung ein. Ich habe die von mir modifizierte Histidin-Schwangerschaftsprobe in einer demnächst in der „Klin. Wochenschr." erscheinenden Arbeit ausführlicher beschrieben.

Zahlreich sind die Möglichkeiten, welche uns die Untersuchung des Mineralstoffwechsels zur Ergänzung der anderen, meistens organische Körper betreffenden Proben bietet. Die Beurteilung der Chlorausscheidung, die nach einem von mir ausgebauten Verfahren [22]) sofort im Harn vorgenommen werden kann, gibt uns Anhaltspunkte dafür, ob wir eine ausgedehntere entzündliche Infiltration annehmen dürfen; eine Verringerung derselben wird selten bei Lungenentzündung, Typhus, Sepsis oder einer anderen schweren Infektionskrankheit fehlen. Sie zeigt uns aber auch, wenn nicht eine besonders kochsalzfreie Kost besteht, an, wie es mit der Aufnahme und Verwertung der Nahrung bestellt ist und wir werden im Zweifel bei herabgesetzter Kochsalzausscheidung im Harn immer ein ernsteres Leiden annehmen dürfen. Bei Nierenerkrankungen, bei Herz- und Leberleiden weist die Retention von Chloriden auf die mangelhafte Ausscheidung von Flüssigkeit durch den Harn und auf Zurückhaltung derselben im Körper hin.

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[19]) Zu beziehen durch Paul Haack, Wien, IX., Garelligasse.
[20]) Rp. Bromi puri 25·0, Ac. Acet. glac. 200·0, Aqu. dest. ad 1000·0.
[21]) Rp. Ammon. pur. conc. 200·0, Ammon. carb. 10 % 100·0.
[22]) Zur Technik der Harnuntersuchung, Biol. Heilk. 1933, Nr. 15.

Ähnlich wie die Chlorausscheidung kann auch relativ einfach die Phosphatausscheidung beurteilt werden, welche namentlich bei den sogenannten alkalischen Herden, den Calcium- und Magnesium-Phosphaten, wichtige Hinweise auf den Abbau von Nerven- oder Knochensubstanz enthält.

Zusammenfassung:

Die „pathochemische Harndiagnostik", die auch als „Wissenschaftliche Harnschau" bezeichnet werden kann, ist eine klinische Untersuchungsmethode. Sie arbeitet nicht mit dem Hilfsapparat großer Laboratorien und erlaubt in relativ kurzer Zeit viele Befunde bei einem Kranken zu erheben. Diese Befunde betreffen, um es noch einmal kurz zusammenzufassen: 1. die physikalischen Eigenschaften des Harns, 2. die Farbstoffausscheidung, 3. den Eiweißstoffwechsel, 4. den Zuckerstoffwechsel, 5. die Fäulnisprodukte, 6. die Mineralsalze. Die Synthese dieser Befunde erlaubt das krankhafte Geschehen im Körper mit großer Präzision allgemein zu erfassen und bringt dem so oft im Dunkel tastenden Arzt häufig Hilfen, welche ihm die übrigen Untersuchungsmethoden vorenthalten müssen.

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THE EVOLUTION OF MODERN SCIENTIFIC LABORATORIES.

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THE EVOLUTION OF MODERN SCIENTIFIC LABORATORIES.[1]

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The scientific discoveries of the present century have had such a profound influence upon inventions, upon industries, and upon the comfort, health, and welfare of the people in general, that there is widespread, even if not always adequate, appreciation of the value of scientific study and investigation. But it may be doubted whether there is any proper understanding, in the minds even of the educated public, of the material circumstances which surround scientific discovery and which make it possible. The average man, if interested at all, is interested that the discovery is made, not how it is made.

In this country, where we must rely mainly upon enlightened private beneficence, and not upon governmental aid, to furnish the pecuniary resources which are essential for scientific progress, it is important that there should be some general information not only regarding the results of scientific work, but also regarding the external material conditions necessary for the fruitful prosecution of such work.

At the present day the systematic study and advancement of any physical or natural science, including the medical sciences, requires trained workers who can give their time to the work, suitably constructed workrooms, an equipment with all of the instruments and appliances needed for the special work, a supply of the material to be studied, and ready access to the more important books and journals containing the special literature of the science.

All of these conditions are supplied by a well-equipped and properly organized modern laboratory. Such laboratories are, with the partial exception of the anatomical laboratory, entirely the creation of the present century, and for the most part of the last fifty years. They have completely revolutionized during the past half century the material conditions under which scientific work is prosecuted. They are partly the result, and in larger part the cause, of that rapid progress of the physical and natural sciences which characterizes the era in which we are living.

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[1] An address delivered at the opening of the William Pepper Laboratory of Clinical Medicine, Philadelphia, December 4, 1895. From the Johns Hopkins Hospital Bulletin, No. 58, January, 1896.

The evolution of the modern laboratory still awaits its historian. It is not difficult to find incidental references to historical facts bearing upon this subject. The development of the chemical laboratory has been traced with some fullness. But it is curious that there is no satisfactory monographic treatment of the general subject of the historical development of scientific laboratories. The subject seems to me an attractive one. It would surely be interesting to trace the development of the teaching and the investigating laboratory back to its beginnings, to learn about the material circumstances under which the physicists, the chemists, the morphologists, and physiologists of former generations worked. What share in the development of laboratories had the learned academies of the Renaissance and of the subsequent centuries? What share had public and private museums and collections of instruments of precision? What share had the work of the exact experimentalists, beginning with Galileo, of physicians, of the alchemists, and of the apothecaries? What individuals, universities, corporations, and governments were the pioneers in the establishment of laboratories for the various physical and natural sciences? The detailed consideration of these and many other questions pertinent to the subject would make an interesting and valuable historical contribution.

There is evidence that in Alexandria, under the early Ptolemies in the third century before Christ, there existed State-supported institutes, in which students of man and of nature could come into direct personal contact with the objects of study, and by the aid of such appliances as were then available could carry on scientific investigations. The practical study of anatomy, physiology, pathology, and other natural sciences was here cultivated. We are very imperfectly informed as to the results and the material circumstances of this remarkable period in the history of science. We know that after about a century of healthy activity the Alexandrian school gradually sank into a place for metaphysical discussions.

Fifteen hundred years elapsed before we next find any record of the practical study of a natural science. In 1231, the great Hohenstaufen, Frederick the Second, who has been called the most remarkable historic figure of the Middle Ages, commanded the teachers at Salernum diligently to cultivate the practical study of anatomy. After the passage of this edict occasional dissections of the human body were made, but it can not be said that there was any diligent cultivation of anatomy on the part either of teachers or of students during the following two centuries.

In the latter half of the fifteenth century there developed that active interest in the practical study of human anatomy which culminated in the immortal work of Vesalius, published in 1543. After this the study of anatomy by dissections gradually assumed in the medical curriculum that commanding position which it has maintained up to the present day.

For over six hundred years there has been at least some practical instruction in anatomy, and for over three hundred years there have existed anatomical laboratories for purposes of teaching and of investigation, although only those constructed during the present century meet our ideas of what an anatomical laboratory should be. It is a matter of no little interest, both for the history of medicine and for that of science in general, that the first scientific laboratory was the anatomical laboratory. Private laboratories for investigation must have existed from the earliest times. Doubtless Aristotle had his laboratory. But the kind of laboratory which we have on this occasion in mind is one open to students or investigators or both. There was no branch of physical or natural science, with the exception of anatomy, which students could study in the laboratory until after the first quarter of the present century. Only in anatomy could students come into direct contact with the object of study and work with their own hands and investigate what lay below the surface.

The famous Moravian writer on education, Amos Comenius, over two hundred and fifty years ago, gave vigorous expression to the conception of living, objective teaching of the sciences. He said: "Men must be instructed in wisdom so far as possible, not from books, but from the heavens, the earth, the oaks, and the beeches—that is, they must learn and investigate the things themselves, and not merely the observations and testimonies of other persons concerning the things." "Who is there," he cries, "who teaches physics by observation and experiment instead of by reading an Aristotelian or other text-book?" But how little ripe were the conditions then existing for the successful carrying out of ideas so far in advance of his times is illustrated by the very writings of the author of "Orbis Pictus" and "Lux in Tenebris."

It would lead too far afield to trace, in detail, on this occasion, the development of physical and of chemical laboratories, but on account of the intimate connection between the development of physics and chemistry and that of medicine, especially of more exact experimental work in the medical sciences, a few words on this subject will not be out of place.

Methodical experimentation in the sciences of nature was definitely established by Galileo, and was zealously practiced by his contemporaries and successors in the seventeenth century. It was greatly promoted by the foundation, during this century, of learned societies, such as the Accademia dei Lincei and the Accademia del Cimento, in Italy, the Collegium Curiosum, in Germany; the Académie des Sciences, in Paris, and the Royal Society, in England. Much of the classical apparatus still employed in physical experiments was invented at this period. Experimental physics from the first acquired a kind of fashionable vogue, and this aristocratic position it has ever since maintained among the experimental sciences. These sciences must concede to physics that commanding position which it has won by the genius of the great natural philosophers, by the precision of its methods, and the mathematical accuracy of its conclusions, and by the fundamental nature and profound interest and importance of its problems. The debt of the medical sciences to the great experimental physicists, from Kepler and Galileo and Newton down to Helmholtz, is a very large one, larger than is probably appreciated by medical men who have not interested themselves in the history of experimental and precise methods in medicine.

There existed in the last century cabinets of physical apparatus to be used in demonstrative lectures, but they were very inadequate, and suitable rooms for experimental work scarcely existed. It was not until about the middle of the present century that we find the beginnings of the modern physical laboratory. Lord Kelvin, then William Thomson, established a physical laboratory in the University of Glasgow about 1845 in an old wine cellar of a house. He tells us that "this, with the bins swept away and a water supply and sink added, served as a physical laboratory for several years." It was as late as 1863 that Magnus opened in Berlin his laboratory for experimental physical research. Since 1870 there has been a rapid development of those splendid physical institutes which are the pride of many universities.

Humbler, but more picturesque, was the origin of the chemical laboratory. This was the laboratory of the alchemist searching for the philosopher's stone. In the painter's canvas we can still see the vaulted, cobwebbed room, with its dim and mysterious light, the stuffed serpent, the shelves with their many-colored bottles, the furnace in the corner with the fire glowing through the loose bricks, the fantastic alembics, the old alchemist in his quaint armchair reading a huge, worm-eaten folio, and the assistant grinding at the mortar. Fantastic and futile as it all may seem, yet here was the birth of modern chemistry. The alchemists were the first to undertake the methodical experimental investigation of the chemical nature of substances. No more powerful stimulus than the idea of the philosopher's stone could have been devised to impel men to ardent investigation. But search for gold was not all that inspired the later alchemists. Paracelsus, the alchemist, that strange but true prophet of modern medicine as he was of modern chemistry, said, "Away with these false disciples who hold that this divine science, which they dishonor and prostitute, has no other end but that of making gold and silver. True alchemy has but one aim and object, to extract the quintessence of things, and to prepare arcana, tinctures, and elixirs which may restore to man the health and soundness he has lost." And again he says of the alchemists, "They are not given to idleness nor go in a proud habit or plush or velvet garments, often showing their rings upon their fingers, or wearing swords with silver hilts by their sides, or fine and gay gloves upon their hands, but diligently follow their labors, sweating whole days and nights by their furnaces. They do not spend their time abroad for recreation, but take delight in their laboratory. They wear leather garments with a pouch and an apron wherewith to wipe their hands. They put their fingers among coals and into clay, not into gold rings."

During the seventeenth and eighteenth centuries the doctrines and work of the alchemists had profound influence upon medicine. Alchemy was not completely overthrown until Lavoisier gave the deathblow to the phlogistic theory of Stahl. But for a considerable time before Lavoisier introduced the new spirit into chemistry its methods and its problems were gradually approaching those of modern times. It was; however, over thirty years after the tragic death of Lavoisier before the first chemical laboratory in the modern sense was established. One can not read without combined feelings of wonder and pity of the incommodious, forlorn, and cramped rooms in which such men as Scheele and Berzelius and Gay Lussac worked out their memorable discoveries. Liebig has graphically described the difficulties encountered by the student of that day who wished to acquire practical training in chemistry. With some of the apothecaries could be obtained a modicum of practical familiarity with ordinary chemical manipulations, but Sweden and France were the centers for those with higher aspirations.

It was the memory of his own experiences which led Liebig, immediately after he was appointed professor of chemistry in Giessen in 1824, to set about the establishment of a chemical laboratory. Liebig's laboratory, opened to students and investigators in 1825, is generally stated to be the first modern public scientific laboratory. Although, as we shall see presently, this is not quite correct, it is certain that Liebig's laboratory was the one which had the greatest influence upon the subsequent establishment and organization not only of chemical laboratories, but of public scientific laboratories in general. Its foundation marks an epoch in the history of science and of scientific education. This laboratory proved to be of great import to medical science, for it was here, and by Liebig, that the foundations of modern physiological chemistry were laid.

The significance of this memorable laboratory of Liebig is not that it was a beautiful or commodious or well-equipped laboratory, for it possessed none of these attributes—indeed, it is said to have looked like an old stable, but that here was a place provided with the needed facilities and under competent direction, freely open to properly prepared students and investigators for experimental work in science.

The chemical laboratories of to-day are, in general, the best organized and the best supported of scientific laboratories.

The need of establishing physiological laboratories was recognized several years before the foundation of Liebig's laboratory. The important results to be derived from the application of the experimental method to the study of vital phenomena had been demonstrated first, and most signally, by Harvey, and after him by many experimenters. The fecundity of exact experimentation by physical and chemical methods applied to the phenomena of life had been shown by the classical researches of Lavoisier on respiration and animal heat. Magendie had entered upon that remarkable scientific career which entitles him to be regarded as the founder of modern experimental physiology, pathology, and pharmacology.

In 1812, Gruithuisen, who, after the custom of the times, filled an encyclopedic chair, being professor in Munich of physics, chemistry, zootomy, anthropology, and later of astronomy, published an article advocating the establishment of physiological institutes. In 1823, Purkinje, one of the most distinguished physiologists of this century, accepted the professorship of physiology in Breslau, this being the first independent chair of physiology in any German university. In 1824, Purkinje succeeded in establishing a physiological laboratory, which therefore antedates by one year Liebig's chemical laboratory in Giessen, although it can not be said to have exercised so great an influence upon the organization of scientific laboratories in general as did the latter. In 1840, Purkinje obtained a separate building for his laboratory.

With two or three exceptions, all of the separate physiological laboratories worthy of the name have been established since the middle of the present century. Bernard, that prince of experimenters, worked in a damp, small cellar, one of those wretched Parisian substitutes for a laboratory which he has called "the tombs of scientific investigators." There can be no greater proof of the genius of Bernard than the fact that he was able to make his marvelous discoveries under such obstacles and with such meager appliances. France was long in supplying her scientific men with adequate laboratory facilities, but no more unbiased recognition of the value and significance of the German laboratory system can be found than in the reports of Lorain, in 1868, and of Wurtz, in 1870, based upon personal study of the construction and organization of German laboratories.

Of modern physiological laboratories, the one which has exerted the greatest and most fruitful influence is unquestionably that of the late Professor Ludwig in Leipzig. This unequaled position it has won by the general plan of its organization, its admirable equipment, the number and importance of the discoveries there made, its development of exact methods of experimentation, the personal character and genius of its director, and the number of experimenters there trained from all parts of the civilized world.

To-day every properly equipped medical school has its physiological laboratory. This department is likely to continue to hold its place as the best representative of exact experimental work in any medical science. A good knowledge of physiology is the best corrective of pseudoscientific, irrational theories and practice in medicine.

Physiological chemistry has been an important department of research for over half a century, but it is only within recent years that there have been established independent laboratories for physiological chemistry. A large part of the work in this branch of science has been done hitherto in laboratories of general chemistry, of physiology, of pathology, and of clinical medicine. A physiological laboratory can not well be without a chemical department, and the same is true of several other medical laboratories; but it seems to me that physiological chemistry has won its position as an independent science, and will be most fruitfully cultivated by those who with the requisite chemical and biological training devote their entire time to it. The usefulness of independent laboratories for physiological chemistry has been shown by the work done in Hoppe-Seyler's laboratory in Strassburg since its foundation in 1872. This was the first independent laboratory of physiological chemistry.

The first pathological laboratory was established by Virchow, in Berlin, in 1856. About this time he wrote: "As in the seventeenth century anatomical theaters, in the eighteenth clinics, in the first half of the nineteenth physiological institutes, so now the time has come to call into existence pathological institutes, and to make them as accessible as possible to all." It can not be doubted that the time was fully ripe for this new addition to medical laboratories. Virchow secured his laboratory as a concession from the Prussian Government upon his return from Wurzburg to Berlin. Virchow's laboratory has been the model as regards general plan of organization for nearly all pathological laboratories subsequently constructed in Germany and in other countries. It embraced opportunities for work in pathological anatomy, experimental pathology, and physiological and pathological chemistry. This broad conception of pathology and of the scope of the pathological laboratory as including the study not only of diseased structure, but also of disordered function, and as employing the methods not only of observation, but also of experiment, should never be lost sight of.

The first to formulate distinctly the conception of pharmacology as an experimental science distinct from therapeutics and closely allied by its methods of work and by many of its problems to physiology was Rudolph Buchheim. This he did soon after going to Dorpat, in 1846, as extraordinary professor of materia medica, and it was apparently not long after he there became ordinarius, in 1849, that he established a pharmacological laboratory in his own house and by his private means. Later, this laboratory became a department of the university and developed most fruitful activity. Buchheim's laboratory was the first pharmacological laboratory in the present acceptation of this term. The conception of pharmacology advocated by Buchheim has been adopted in all German universities, and in not a few other universities; but it can not be said to have been as yet generally accepted in the medical schools of this country and of Great Britain, although it seems destined to prevail.

The medical science which was the latest to find domicile in its own independent laboratory is hygiene. To Pettenkofer belongs the credit of first establishing such a laboratory. Since 1847 he had been engaged with hygienic investigations, and in 1872 he secured from the Bavarian Government the concession of a hygienic institute. This admirably equipped laboratory was opened for students and investigators in 1878. By this time Koch had already begun those epochal researches which, added to the discoveries of Pasteur, have introduced a new era in medicine. The introduction by Koch of new methods of investigating infectious diseases and many hygienic problems became the greatest possible stimulus for the foundation of laboratories of hygiene and bacteriology, and to some extent also of laboratories of pathology. The results already achieved by these new methods and discoveries in the direction of prevention and cure of disease, and the expectation of no less important results in the future, constitute to-day our strongest grounds of appeal to governments and hospitals and medical schools and the general public for the establishment and support of laboratories where the nature, the causes, the prevention, and the cure of disease shall be investigated. You have established here, in this city, and in connection with this university, the first hygienic laboratory of this country, housed in its own building and assured, I believe, of a future of great usefulness.

It is apparent, from the brief and imperfect outline which I have presented of the evolution of modern scientific laboratories, that the birthplace of these laboratories, regarded as places freely open for instruction and research in the natural sciences, was Germany. Such laboratories are the glory to-day of German universities, which possess over two hundred of them. By their aid Germany has secured since the middle of the present century the palm for scientific education and discovery.

Great scientific investigators are not limited to any country or any time. There are those of surpassing ability who will make their own opportunity and will triumph over the most discouraging environment. This country and every civilized country can point to such men, but they are most exceptional. The great majority of those even with the capacity for scientific work need encouragement and opportunity. We now have sufficient knowledge of the workings of scientific laboratories to be able to assert that in general where the laboratory facilities are the most ample and the most freely available, there are developed the largest number of trained workers, and there the discoveries are the most numerous and the most important. At the present day no country, no university, and no medical school can hold even a respectable place in the march of education and progress unless it is provided with suitable laboratories for scientific work.

A properly equipped and properly conducted scientific laboratory is a far more expensive institution than is usually conceived. It must be suitably domiciled either in a separate building or in rooms commodious and well lighted. The outside architectural features are of secondary importance. The instruments and appliances necessary for exact observation and experiment, even in those sciences which apparently require the least, are numerous and costly. A working library, containing the books and sets of journals most frequently consulted, is most desirable, if not absolutely indispensable. The director of the laboratory should be a man of ability and experience, who is a master in his department of science. He must have at least one assistant, who is preferably a young man aiming to follow a scientific career. A person of no small value in the successful working of the laboratory is the intelligent janitor or "diener," who can be trained to do the work of a subsidiary assistant and can be intrusted with the care and manipulation of instruments. There must be funds for the purchase of fresh supplies and new instruments when needed. The running expenses of a first-class laboratory are not small.

But costly as may seem the establishment and support of a good laboratory, the amount of money expended for laboratories would seem to us ridiculously insignificant if we could estimate the benefits to mankind derived from the work which has been done in them. Wurtz has truly said of the money required for laboratories, "It is a capital placed at a high rate of interest, and the comparatively slight sacrifice imposed upon one generation will bring to following generations increase of well-being and knowledge."

The educational value of the laboratory can not well be overestimated. For the general student this is to be found primarily in the development of the scientific habit of thought. He learns that to really know about things it is necessary to come into direct contact with them and study them. He finds that only this knowledge is real and living, and not that which comes from mere observation of external appearances, or from reading or being told about things, or, still less, merely thinking about them.

The problem of securing for the student of medicine the full benefits of laboratory instruction in the various medical sciences is a difficult one, and can not, I believe, be solved without considerable readjustment of existing schemes of medical teaching; but this subject is one which I can not attempt to consider here.

The whole face of medicine has been changed during the last half century by the work of the various laboratories devoted to the medical sciences. Anatomy, physiology, and pathology now rank among the most important of the sciences of nature. They have been enriched with discoveries of the highest significance and value not only for medicine, but also for general biology. Although we have not penetrated, and perhaps may never penetrate, the mystery of life, we are coming closer and closer to an understanding of the intimate structure and the fundamental properties of living matter. We already know that living matter is not that homogeneous, formless substance which not many years ago it was believed to be, but that it possesses a complex organization.

Practical medicine has been profoundly influenced by the unparalleled development of the medical sciences during the last fifty years, and especially during more recent years. Scientific methods have passed from the laboratory to the hospital. Cases of disease are now studied with the aid of physical and chemical and microscopical and bacteriological methods. The diagnosis of disease has thereby been greatly advanced in precision, and if Boerhaave's motto, "qui bene diagnoscit, bene medebitur," be true, there should be a corresponding advance in the results of the treatment of disease. Whether or not this dictum of the old master be true—and I have serious doubts as to its entire truth—it can not be doubted that great progress has been made in medical, and especially in surgical, treatment as a result of scientific discoveries, although the treatment of disease still rests, and will doubtless long continue to rest, largely upon empirical foundations.

We are assembled here to-day to assist at the opening of a laboratory which gives the fittest and strongest possible expression to the influence of scientific work upon practical medicine. The generous founder has marked with characteristic insight the direction in which the current is setting.

The conception of a thoroughly equipped laboratory as an integral part of a hospital and intended for the study and investigation of disease is of recent origin. The germs of this idea, however, may be traced back to such men as Hughes Bennett and Beale in Great Britain, and to Frerichs and Traube in Germany, who in their hospital work made fruitful application of microscopical, chemical, and experimental methods. A little over ten years ago, Von Ziemssen, in Munich, established a well-conceived clinical laboratory, containing a chemical, a physical, and a bacteriological department, a working library, and rooms for practical courses and the examination of patients. A similar laboratory was secured by Curschmann in Leipzig in 1892.

The growing recognition of the need of such laboratories is the result of the great progress in scientific medicine during recent years. The thorough clinical examination of many cases of disease now requires familiarity with numerous technical procedures, physical, chemical, microscopical, and bacteriological. The laboratory outfit required simply for routine clinical examinations is considerable. A microscope and a few test tubes and chemical reagents for simple tests of the urine no longer suffice. As illustrations of this, I call attention to the clinical value of examinations of the blood, of the contents of the stomach, of fluids withdrawn from the serous cavities, of the sputum and various secretions, of fragments of tissue removed for diagnosis. Such examinations require much time, trained observers, and considerable apparatus. To secure for the patients the benefits in the way of diagnosis, prognosis, and treatment to be derived from these methods of examination, a hospital should be supplied with the requisite facilities.

A hospital, and especially one connected with a medical school, should serve not only for the treatment of patients, but also for the promotion of knowledge. Where this second function is prominent, there also is the first most efficiently and intelligently carried out. Herein we see the far-reaching beneficence of a laboratory, such as this one, thoroughly equipped to investigate the many problems which relate to clinical medicine.

The usefulness of an investigating laboratory in close connection with a hospital has already been abundantly demonstrated. Chemical studies, more particularly those relating to metabolism in various acute and chronic affections, microscopical and chemical investigations of the blood and bacteriological examinations of material derived directly from the patient, may be mentioned as directions in which researches conducted in hospital laboratories have yielded important results and will garner still richer harvests in the future.

There need be no conflict between the work of clinical laboratories and that of the various other medical laboratories. Each has its own special field, but it is not necessary or desirable to draw around these fields sharp boundary lines beyond which there shall be no poaching. It will be a relief to pathological and other laboratories to have certain examinations and subjects relating directly to practical medicine consigned to the clinical laboratory, where they can receive fuller and more satisfactory consideration. The subject-matter for study in the clinical laboratory is primarily the patient and material derived from the patient. Anatomical, physiological, pathological, pharmacological, and hygienic laboratories must concern themselves with many problems which have apparently no immediate and direct bearing upon practical medicine. In the long run, their contributions are likely to prove most beneficial to medicine if broad biological points of view, rather than immediate practical utility, are their guiding stars. The clinical laboratory will concern itself more particularly with questions which bear directly upon the diagnosis and the treatment of disease.

To the small number of existing well-equipped clinical laboratories the William Pepper Laboratory of Clinical Medicine is a most notable addition. It is the first laboratory of the kind provided with its own building and amply equipped for research in this country, and it is not surpassed in these respects by any in foreign countries. It is intended especially for investigation and the training of advanced students. It is a most worthy memorial of the father of its founder.

William Pepper, the elder, was a very distinguished physician and trusted consultant of this city, for many years an attending physician at the Pennsylvania Hospital, where he was a clinical teacher of great influence, and for four years the professor of the theory and practice of medicine in this university. He belonged to that remarkable group of American physicians, trained under Louis, who brought to this country the best methods and traditions of the French school of medicine at the time of its highest glory. His diagnostic powers are said to have been remarkable. With his broad sympathies, his lofty ideals, and his active and enlightened efforts for the promotion of clinical medicine, how he would have welcomed such opportunities as will be afforded by this laboratory to contribute to a better knowledge of the nature, the diagnosis, and the treatment of disease.

Our country has, until within a very few years, been deprived of the encouragement and opportunities for original investigations in the medical sciences afforded by large and thoroughly equipped laboratories. We can still count upon the fingers of one hand our medical laboratories which are comparable in their construction, organization, and appliances to the great European laboratories. Notwithstanding these obstacles, there have been American physicians of whose contributions to medical science we may feel proud.

But a new era has dawned. Of that we are witnesses here to-day. The value of medical laboratories is now widely recognized among us. To those of us who appreciate the underlying currents in medicine, who follow with eager interest the results of the almost feverish activities in foreign laboratories, who recognize the profound interest and importance of the many medical problems which await only patient investigation and suitable facilities for their solution, and who would like to see our country take the prominent position it should in these investigations, our laboratories may seem slow in coming, but they will in time be provided by enlighted benevolence. The individual or institution or hospital which contributes to the establishment of a good laboratory devoted to any of the medical sciences merits in unusual degree the gratitude of all medical men; yes, of every true friend of humanity. Such gratitude we feel for the generous and public-spirited founder of this laboratory, who has contributed largely to the advancement of medicine in this country, and of whose splendid services to this university I need not speak in this presence.

I congratulate this city and this university and this hospital upon the important addition made by this laboratory to higher medical education and the opportunities for scientific work in this country. May the enlightened aims of the founder and the hopes of all interested in the promotion of medicine in this country be fulfilled by the scientific activities which will now begin in the William Pepper Laboratory of Clinical Medicine.

W. H. M. M.

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JANUS

Archives internationales pour l'Histoire de la Médecine et la Géographie Médicale.

(Organe de la Société historique des Sciences médicales, exactes et naturelles.)

Rédacteurs en chef:

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Prof. Dr. E. C. VAN LEERSUM, AMSTERDAM.

30me Année -:- -:- -:- EXTRAIT. -:- -:- -:- 1926.

LEYDE (Hollande). — E. J. BRILL.

THE WELLCOME HISTORICAL MEDICAL MUSEUM

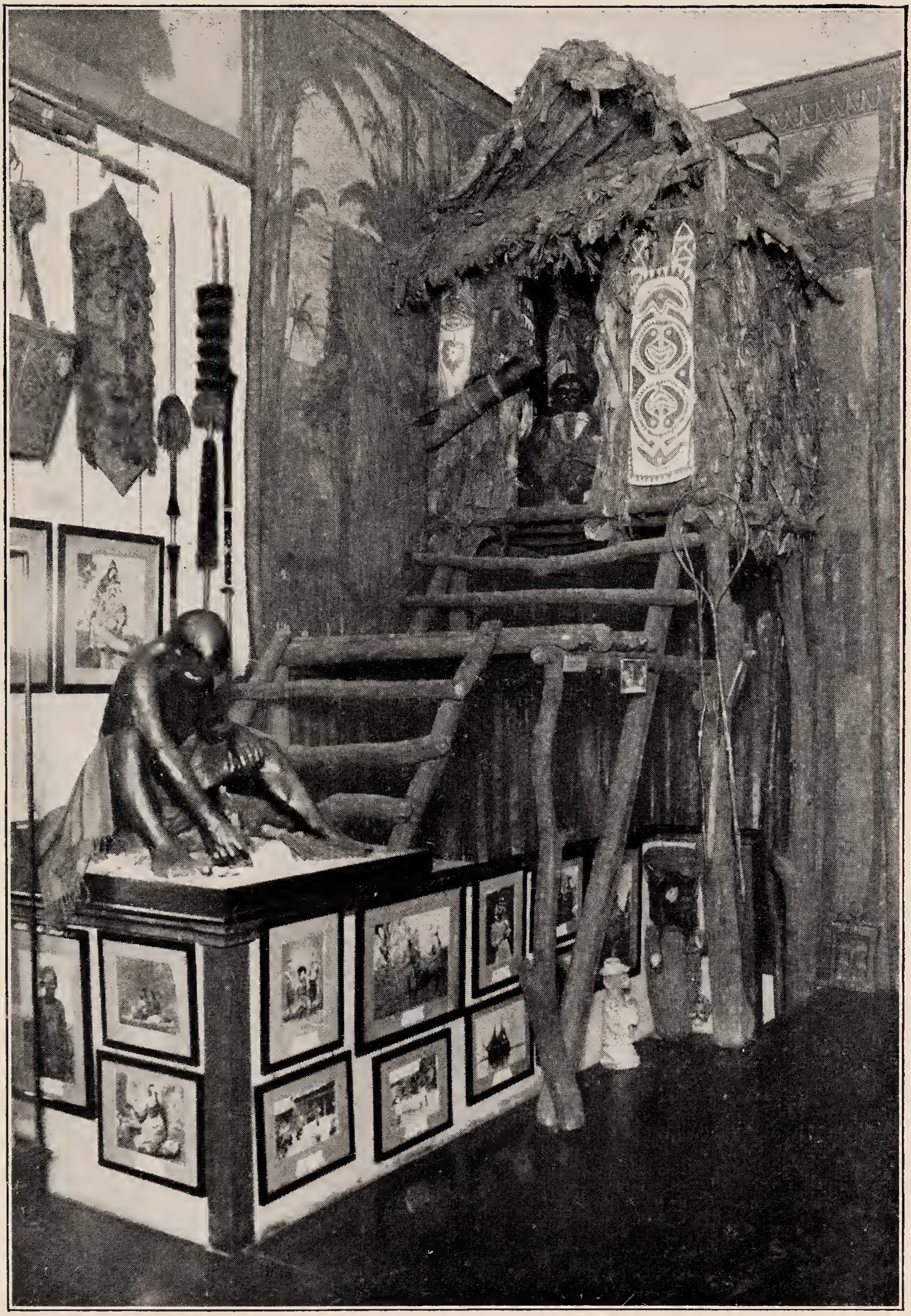
54A, WIGMORE STREET, LONDON, W. 1.

The Wellcome Historical Medical Museum contains an extensive collection of rare objects, pictures, sculptures, manuscripts, early printed books, etc., illustrating the evolution and practice of Medicine and Allied Sciences throughout the world from prehistoric times, and includes a section dealing with primitive medicine, surgery and the healing arts amongst savage and semi-civilised peoples of to-day.

Special sections are devoted to Memorial Collections of objects originated by, used by, or associated with eminent men who have made history by their great achievements in medical science. These include Dr. EDWARD JENNER's relics, original manuscripts, instruments, etc., connected with his development of vaccine treatment for small-pox, and also Lord LISTER's original appliances, chemical reagents and other materials which he used in the development of his methods of antiseptic surgery as practised by him in the "Lister Ward" of the Glasgow Infirmary and elsewhere. A portion of the original "Lister Ward", reconstructed from the actual material and fitted with the original equipment, forms an important exhibit in the Museum.

The aim and purpose of the Founder are to render the collections of real educative value and to make them helpful to research workers, students and others interested in the History of Medicine and Allied Sciences.

The Museum was re-opened at a Ceremony presided over by Sir HUMPHRY ROLLESTON, Bt., K. C. B., M. A., M.D., F.R.C.P., Regius Professor of Physic, University of Cambridge. In the un-



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HEAD HUNTER'S HUT
South East New Guinea
Wellcome Historical Medical Museum

avoidable, and deeply regretted, absence of the Founder (Mr. HENRY S. WELLCOME) the guests were received by Sir HUMPHRY ROLLESTON and Dr. John D. COMRIE, M.A., F.R.C.P., F.S.A., Lecturer on the History of Medicine, Edinburgh University.

In the course of his Introductory Speech from the Chair, Sir HUMPHRY ROLLESTON said: — The study of medical history is somewhat paradoxically a modern development, and its expansion in this country has been largely due to Dr. J. F. PAYNE, Sir W. OSLER, Sir CLIFFORD ALLBUTT, and especially to Sir N. MOORE, who, as President of the Section of the History of Medicine of the International Congress of Medicine in London, opened for the first time this Museum on June 24, 1913. Since then it has grown from strength to strength, and, after a complete re-organization, which necessitated its closure for eleven months, is virtually a new museum. This research museum is intended to be continually progressive, not to remain as the last word in 1926, but to keep up with the advance of medicine. In the various groups, such as anatomy, physiology, chemistry, pharmacology, orthopædics, obstetrics, psychiatry, massage and antiseptic surgery, it will show at a glance the evolution of ideas, discoveries and inventions in a really scientific manner. Thus, in addition to advances, it will elucidate the retrogressive changes which took place in some ancient eastern countries and in Europe during the dark ages.

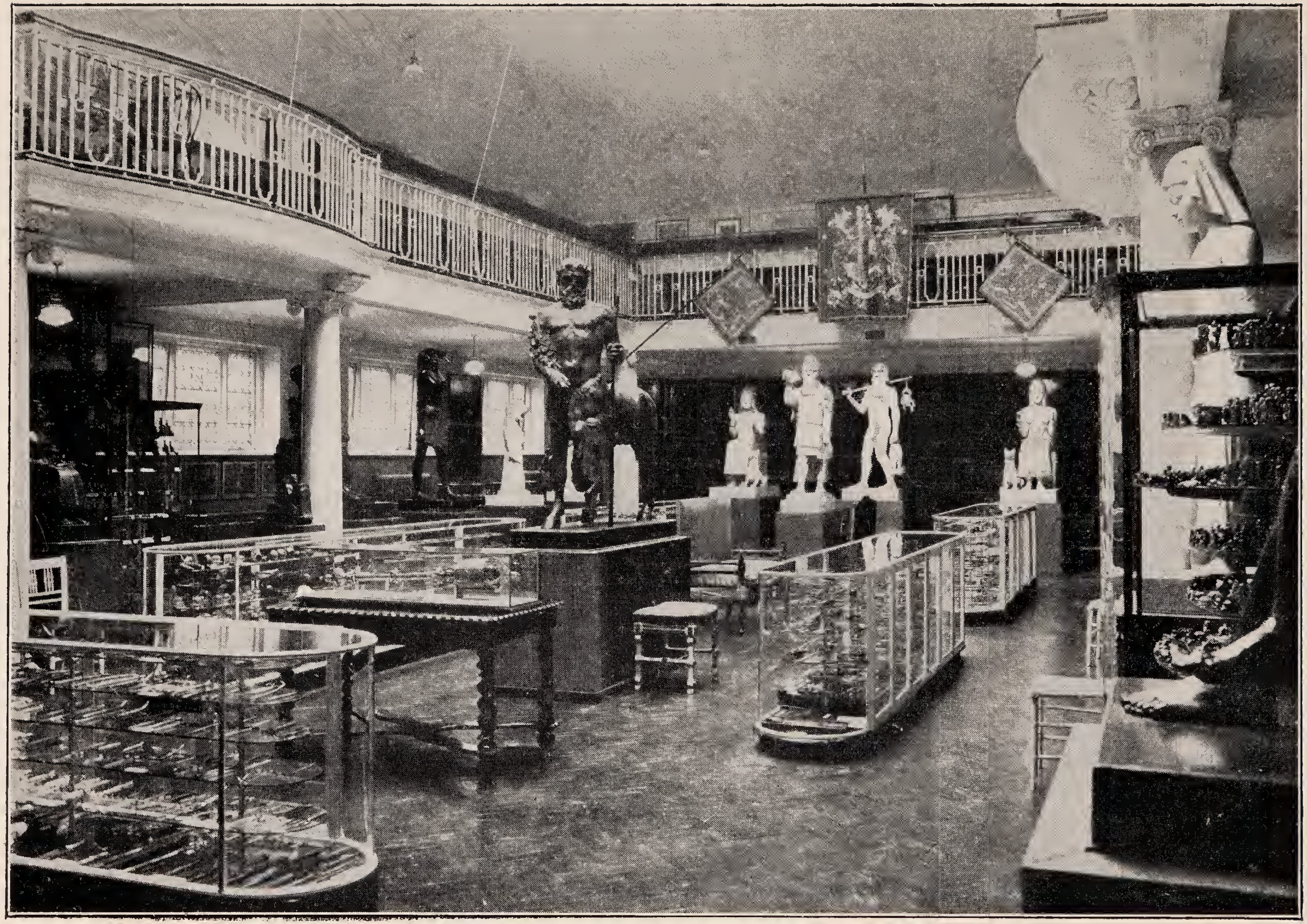
Familiarity with what „famous men and our fathers who begat us" have done to build up our present state of knowledge has a great educational value. Further, it exerts a wholesome influence in making us feel modest from the realization of what our professional ancestors did in so much less favourable circumstances; we may indeed even find that discoveries made, or largely anticipated, by them years ago and long forgotten have independently again been brought to the light of modern eyes. It is salutary to look back and occasionally, as has been done with much advantage in the past, to act on the dictum "back to Hippocrates". The Great War carried the practice of surgery "back to Lister", the centenary of whose birth will be celebrated next year. Antiseptic surgery and anæsthetics are the two greatest milestones in the advance of surgery, and here is presented a collection of Listerian relics-unrivalled for its completeness; it includes part of Lister's ward in the Royal Infirmary, Glasgow, where he did his immortal work, which, had it not been for Mr. WELLCOME's prompt action, would have been for ever lost when the building was demolished two years ago.

London is fortunate indeed in this unique Museum, and the whole medical profession are under a deep debt to Mr. H. S. WELLCOME for his unbounded generosity and enterprise in making and throwing open to us all this wealth of historical lore. It is indeed difficult to say what this Museum, with its contents and a library of more than 100.000 books, manuscripts and incunabula so quietly amassed, will mean to medicine in the future. Its resources have always been most freely at the call of those interested and working at the subject, as the Members of the Section of the History of Medicine know to their continual advantage.

WHAT SHOULD MUSEUMS DO FOR US?

Historical Address by Sir ARTHUR KEITH, M.D., F.R.C.S., F.R.S., Conservator of the Museum, Royal College of Surgeons, England:

Often there comes back to me, when I think of what was happening in this great city in the middle of last century, a vision of the wan and studious face of HENRY THOMAS BUCKLE as it was bent over the manuscript of his "History of Civilization in England". As he wrote in his study, a long, lofty gaunt room with northern roof light, he was surrounded by thousands of manuscripts, deeds, documents and books — the material of history. BUCKLE thought, and there are many to-day who still share in his belief, that history could be written only in this way. Even when BUCKLE tells of the discoveries made by WILLIAM SMITH in the opening years of the nineteenth century — of how the crust of the earth was arranged in strata and that the order and age of the strata could be told by the fossils contained in them — he did not perceive that geologists had discovered a new way of writing history by deciphering things and not words. In this new way the history of the world on which we live is now being written; when geologists began to arrange their fossils in an



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HALL OF STATUARY
Looking North
Wellcome Historical Medical Museum

orderly way on the shelves of a museum, that museum thereby became not only a history of the earth but of all the living things that had appeared on it during past times. Presently it was discovered that the early history of man himself could be written in the new way. In BUCKLE's boyhood — he was born in 1821 and died in 1862 — the archæologists of Denmark discovered that it was possible still to write the early history of their own country. They searched ancient tombs and peat-mosses for all things which showed traces of man's handiwork and gathered them — each labelled and documented — on the shelves of a museum, and presently that museum became a history of Denmark. The archæologists perceived that Denmark has passed through three epochs — one, in which only stone or bone had been used for weapons or tools; another, when stone and bone were being replaced by bronze; and a third, in which iron began to be used instead of bronze. Hence the division of the prehistoric time intro three periods — stone, bronze and iron. History begins when a chronological table has been established, and we see this method of writing prehistory reaching a climax in the hands of Sir ARTHUR EVANS; the history of Crete has been deciphered by the spade and written on the shelves of the Museum at Knossus. It is in this way that the beginnings of our modern manner of living are being deciphered in Mesopotamia and Egypt. Museum making and history writing are the same thing.

England has a way of throwing up sporadic crops of great men; she had a bumper crop in the 19th century: Darwin, Galton, Taylor and Pitt-Rivers came along almost in a bunch — Darwin leading. It was Pitt-Rivers who demonstrated how reliable human history could be built up, bit by bit, in the shelves and showcases of a museum; it was he who made the spade an instrument of exact history in the hands of a trained observer; it was he who pressed home the study of living primitive peoples as a clue to the customs, myths and beliefs of our long dead ancestors. What Pitt-Rivers did for human culture in general Mr. WELLCOME has sought to do for a great branch of human knowledge — all that pertains to the art and science of healing. He has ransacked the world and brought together under one roof a rich, rare and vast assortment of materials for the history of Medicine such as has never before been seen or studied in any country. It would be dangerous in these times, when we dispute so keenly how far men simply imbibe ideas and how far they beget them for themselves, to speculate as to the influence which the example of Pitt-Rivers may have had on Mr. WELLCOME. I believe, in this case, we have an instance of independent origin. Be that as it may, I am convinced that we who have to do with the administration of museums will do well to adopt Pitt-Rivers as our Patron Saint.

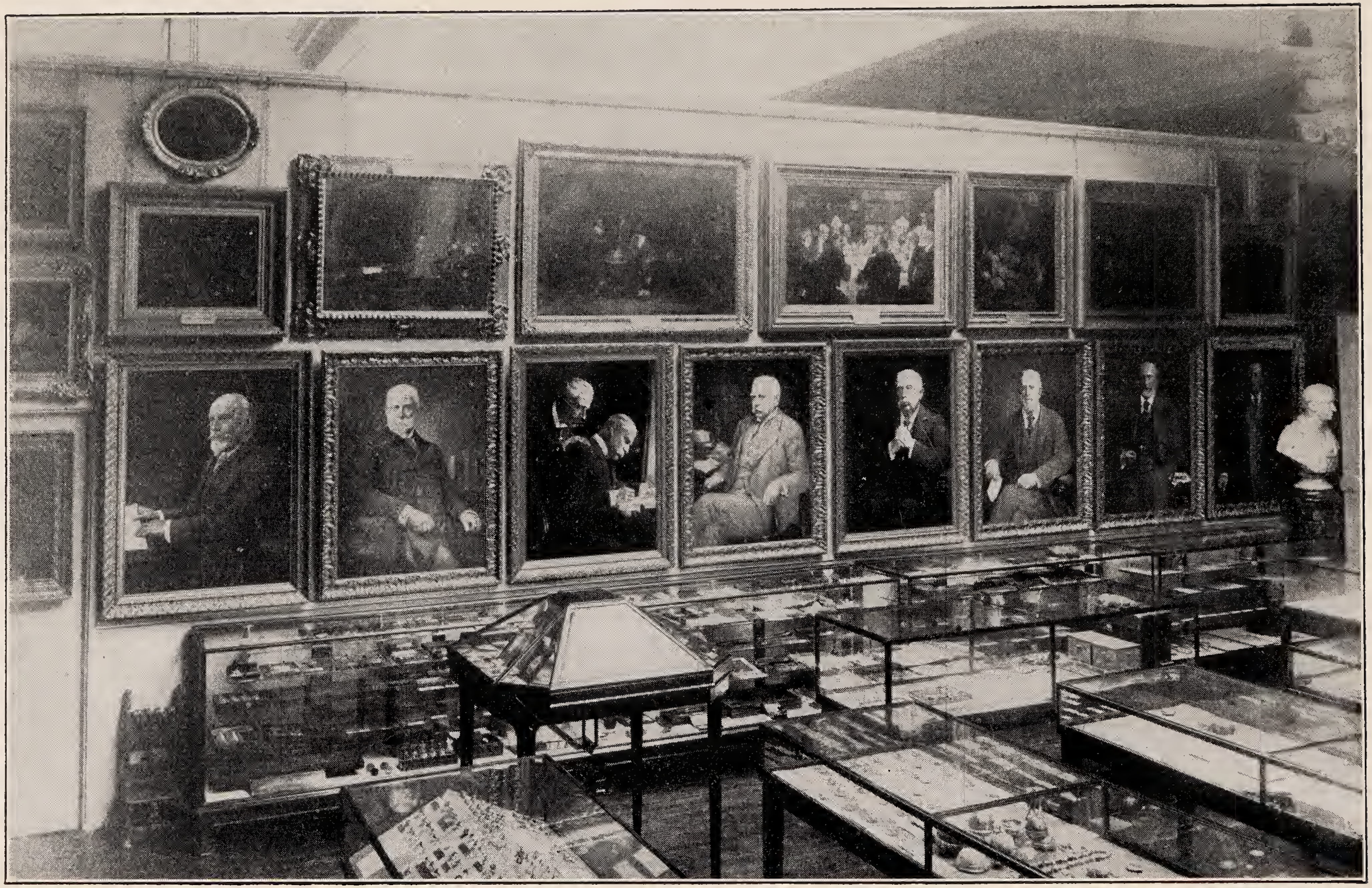
Now the evolution or history of medicine is more difficult than any other branch of knowledge to illustrate by museum methods. The trend of evolution is nearly always towards complication; if we trace the history of a man's fighting weapons, we begin with a few types of a simple kind and we end in these modern days with the innumerable and highly differentiated engines of war. But in Medicine it is otherwise; even amongst the most primitive races of mankind, we find that the practice of medicine is founded on an elaborate code of beliefs; these beliefs are the fine-drawn gossamer of savage fancy — altogether too delicate threads for the clumsy fingers of museum curators to touch. If our task were merely to illustrate how the Medicine Man, whose image you will see to-night in his hut in New Guinea, seated amidst the simple and uncouth emblems of his art, becomes the fashionable physician of Harley Street with the artillery of modern science at his disposal, there would be no technical difficulty, for from the countries which lie between New Guinea and Harley Street we could cull a perfect series of ascending forms — an intermediate series of the kind which is so dear to the hearts of museum curators. Our difficulties begin when we seek to portray how the native practitioner looks upon the human body when it is well and when it is ill. Until we have surmounted this difficulty we cannot appreciate the riches which are shown in Mr. WELLCOME's "Hall of Primitive Medicine"

To give a concrete representation of the beliefs in which Medicine begins is particularly hard for men like myself. We have been trained to accept only what we can see and prove, to suppress all our childish notions. We find it almost impossible to take the mentality of primitive medicine seriously. It would have been otherwise with Lewis Carroll, the immortal creator of "Alice in Wonderland"; he understood how children reasoned and, therefore, could have entered the hearts of primitive men without effort. There can be no doubt that in the play of his fancy, early man, like the primitive races of to-day, was a child and had a childish way of reasoning. The late and gifted Dr. W. H. R. Rivers, in his enquiries into the theory and art of Medicine among the natives of Melanesia, was able to lay aside the scientific armature of his mind and to adopt the point of view of the practitioners he encountered in primitive communities. He found that the rudest native practitioner had, like his counterpart of Harley Street, a definite theory of disease and that the means he adopted for its cure were a logical outcome of this theory. Had LEWIS CARROLL told a New Guinea medical man that after the material Cheshire cat had vanished its smile remained behind, the statement would have been accepted without the raising of an eyebrow. It must be a very long time ago since primitive man began to look on the human body as a mere husk and the spirit within it as the real person, for this way of interpreting the living body is almost universal among native peoples. On this belief the native physician bases his treatment of disease. If a man is to be free from illness his spirit must remain free, intact, uninjured. Illness, the native holds, springs from the spirit — not, as we believe, from the flesh. If the spirit be driven out of the body and forsakes it permanently, then death occurs. This is how the Melanesian explains death to himself and to his patients. Hence, a native practitioner's business is to discover in what way injury or damage has fallen on his patient's spirit, and, as these injuries are usually caused by other spirits or baneful influences, it is clear that a native, to practise successfully, must have studied and mastered the ways and wiles of these immaterial beings and things. The expert native practitioner is he who can best cajole the cloud of spirits which permeate the air of primitive communities.

As we dig into the beginnings of Medicine we find that its foundations are laid on leechcraft, witchcraft and priestcraft. The early physician was also magician and priest. Unless you have grasped this truth you will altogether fail to understand Mr.

Wellcome's „Hall of Primitive Medicine"; for in that Hall you will find a wealth of amulets, charms, talismans, mascots, phylacteries, totems, fetishes, divination bowls, effigies, idols, masks and ceremonial dresses. When you examine the contents of that room you are really surveying a massed field of therapeutic artillery — the batteries by which ancient physicians sought to banish illness and disease from their patients, thus staving off death. The counterparts of the native artillery in Harley Street are the stethoscope, the bismuth meal, note-book for prescription, and a certain professional air.

I have drawn your attention to this part of Mr. Wellcome's collection for a special reason. When we seek to represent in a museum the theories and beliefs which guided the practice of Medicine in olden times, we encounter a grave difficulty. Let me explain the nature of this difficulty. If we dress a lay figure in a policeman's uniform, place a helmet on the head, a baton in one hand and handcuffs in the other, and lay open the policeman's note-book at the page he made his last entry, we bring before our visitors such a representation of law and order as enters their understanding without any further explanation. But suppose we have merely the arm badge of a special constable at our disposal; how are we to make our visitors understand its full significance if they have never encountered a policeman in their life? That is just the difficulty we have to face in representing early stages in the evolution of Medicine; the divination bowl, fetish, amulet, charm, mascot and effigy are but the symbols of the ancient practitioner's art; each is pregnant with significance; it needs a world of knowledge to interpret that significance. It is otherwise in all the modern departures of Medicine. You will have an opportunity to-night of examining in this Museum all the stages in the evolution of utensils, apparatus and instruments employed in modern Medicine and Surgery; never before has the story of surgical instruments been told with such a wealth of illustration as will fall under your eyes here. The microscope is the main instrument of medical progress; this Museum contains its full history in the great collection shown in the Gallery. Never before have such pains been taken and so much wealth lavished to secure exact reproductions of the



PORTRAIT GALLERY
Part of east wall
Wellcome Historical Medical Museum

Copyright Wellcome Hist. Med. Mus.

conditions amidst which druggist, chemist and apothecary carried out their respective callings in past times. You will see the actual ward from the old Infirmary of Glasgow in which Lord LISTER banished from the world for ever some of the most dreaded of human sufferings. If you are inclined to think that the value of this exhibit is sentimental rather than useful, a glance at its bare ugly walls and its sordid equipment will alter your opinion. I was trained in just such a ward and know that the picture here preserved is true to its time. The men and women of a younger generation, who have grown up in clean bright wards with modern equipment can only realize the blessings which progress has brought them, when they view the ward in which Lord LISTER's patients lay as he and his nurses ministered to their needs.

You will turn away from Lord LISTER's ward devoutly thankful that it is now only a historical record; it depicts a state of matters which we have left behind us. It is possible, as you walk through the Hall of Primitive Medicine and your eye catches again the weird and uncouth equipments of native witch doctors which cover its walls and fill its cases, that you will view these exhibits as mere flotsam and jetsam from the Dead Sea of Medicine — one which enlightened England has long since swept away. I should like to think this is so, but when I see, as I sometimes do, mascots on the motor cars of the wealthy, charms and amulets treasured by many people — both rich and poor — ignorant and educated; when I see, as I occasionally do, the quack preferred to the man who has given his life to the study of rational Medicine; and when I see learned men call in spirits to explain unusual physical phenomena; then I am not quite so certain that this part of Mr. WELLCOME's Museum does represent altogether a past stage of things. In all of us there still remains more than a trace of the primitive man.

Now I come to what is the main matter of my discourse. What is the service that such a Museum as this should render to Medicine? Let me put the question on a wider basis. What should museums do for us? You will pardon my immodesty if I refer for a moment to the services which museums have rendered to myself. Thirty-five years ago I returned from a sojourn in the East, where I had accumulated a great many facts relating to anatomy, and in my pocket just enough money to secure food and lodging for a year or two. My little cargo of anatomical facts was of no use in the world of learning until it had been compared with and added to cargoes brought home by previous voyagers into the realms of Anatomy. It was my first duty to assimilate the publications of other workers and to study kindred material which had been gathered in our great Museums. The British Museum was thrown open to me; in its Reading Room attendants brought and laid before me books and manuscripts of all times and of all countries. The treasures in the Natural History Museum, South Kensington, were placed freely at my disposal. The Museum which I have now the honour to be closely connected with, served me as a study and as a research room. All of these institutions were provided for me gratis, free and for nothing. I never enquired into the cost of running these great institutions during the years I was using them, but I can tell you what all three cost last year. The British Museum, Bloomsbury, required £ 221.000; the Natural History Museum, South Kensington, £ 100.000; the Museum of the Royal College of Surgeons, the most economical and best Museum of its kind in the world, £ 6000. Now that is a great sum of money; Museums, as Mr. WELLCOME knows well, are very costly machines to run, to say nothing of the initial cost of bricks and mortar, and also outfit. To produce an income of £ 327.000, the sum now spent annually on these three institutions, needs a capital of about 6½ millions. You can see, then, that in those early days of study and research in London I was, although I did not realize it, terribly wealthy. I had the privileges of a Crœsus — a multimillionaire. At least I had at my disposal that which had cost millions. It is plain that museums as instruments of research are very costly, and you may ask if the country is getting an adequate return for its great outlay. Well, if I had been the only student who then enjoyed museum benefits, our country would have had an altogether unsatisfactory return for its expenditure, but I was only one of many of that generation. The generation which was young thirty years ago is now providing their country with leaders and teachers, and England is reaping to-day the harvest she sowed in museums a generation ago. You see that I do not hesitate in regarding the increase of knowledge — the fostering of research — as the first duty of a museum. Unless a museum is permeated with a spirit of enquiry it is dead. It is not enough to furnish a museum with the materials needed by students; no conservator can understand what a student needs unless he is also a student. The staff of a museum must be permeated with the love of knowledge and know how it can be extended if their institution is to thrive; and no man can continue to be a student unless you give him an exit for his knowledge. Unless he is encouraged to coin his gold and pass it into circulation, his mint becomes choked. One knows that a museum is prospering when the members of its staff are participating in the proceedings of learned societies and contributing to their publications. One knows that a museum is fulfilling its primary function when its rooms and closets are frequented by research students from homelands, colonies and foreign countries, and one knows that its contents are being rightly used by the frequency of grateful acknowledgments in learned publications. The literature which issues from a museum determines its status, and in this literature I include catalogues.

If the first duty of a museum, such as this of Mr. WELLCOME, is to serve the needs of students and through students the public weal, there is a second duty no less important. There is its immediate duty to the public — the duty of direct education. It is this double duty of a museum that taxes the ingenuity of us conservators. To expose the whole of our resources to the gaze of visitors would be to satiate — not to whet — their curiosity. We produce in them not only headache but mental dyspepsia. We have to select from our great stores on which special students regale themselves, just those prime pieces of instruction which when set in a right order, tell their story with emphasis and without words. Such an art needs a special genius, just as "window-dressing" does in the world of commerce, but I have noticed that the best elementary treatises are usually written by the most learned of our masters, and I am therefore hopeful that the most learned of our curators will also prove the greatest craftsmen in the art of "case-dressing". It is an art which makes a special appeal to Mr. WELLCOME and he has surrounded himself with a staff of learned and expert men. He has chosen, as his Conservator, Mr. W. L. G. MALCOLM, one who is already known by his important contributions to anthropology and we all wish him and his colleagues the utmost success in fulfilling the aims which the founder of this Museum has in view.

All of us who regard museums not only as repositories of valuable things but as engines for the advancement of knowledge owe a debt to Mr. WELLCOME. Students of history are usually poor men and this is particularly true of those who seek to unravel and write the true history of Medicine. The materials needed for our studies are far beyond the resources of our purses. There are those men, who, setting out in their careers to banish care by obtaining a sufficiency to carry them and theirs to the end of life's journey, awake to find that wealth accumulates on them so fast that affluence becomes more burdensome than the cares of poverty. Well! we who benefit from museums are not in this group of men. If a poor man has to seek comfort in philosophy, a rich man if he is to retain his soul, has to seek it as a necessity. The other day it was my good fortune to read a book written by a man who has become both a millionaire and a philosopher. "I have long felt and believed", he tells us, "that every man who has attained material success should look upon himself as an investment, so to speak, which the community has made. In return for the opportunities given to him and for the financial results they have brought, it is up to him to yield dividends in service and in other things of value to the community". Long before this philosophy for wealthy men had been formulated, Mr. Henry S. WELLCOME, in his own quiet but efficient way, had begun to put it into practice. He had come to the rescue of us poor students and put at our disposal, and for the ultimate good of mankind, this Museum with its rich and rare stores of knowledge culled from all the countries of the world and from all periods of time. He has lifted our poverty above all dreams of avarice and has thereby earned the lasting gratitude of all who believe that the safety of our civilization lies in the progress and dissemination of knowledge.

XVIIth International Congress of Medicine
London: 1913

History of Medicine

Græco-Roman Surgical Instruments represented in Egyptian Sculpture

BY

HENRY S. WELLCOME

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1913

[Friday Afternoon, August 8]

SECTION XXIII

HISTORY OF MEDICINE

INDEPENDENT PAPER

GRÆCO-ROMAN SURGICAL INSTRUMENTS REPRESENTED IN EGYPTIAN SCULPTURE

By HENRY S. WELLCOME

WHEN in Egypt in 1910, I noticed and photographed an interesting incised sculptured stone-tablet in the Temple at Kôm-Ombos, situate on the Nile, 900 kilometres south of Cairo. It consists of representations of a number of gynæcological instruments.

Kôm-Ombos marks the site of the ancient Egyptian city of Pa-Sebek, ‘ the House of Sebek,’ where the Crocodile god was worshipped, together with the Hawk-headed Horus, called Heru-Ur, or ‘ the Greater Horus,’ the Aroueris of the Greeks. This great temple was built by Ptolemy VII, 181–146 B.C., but there were traces of an earlier building in the form of a sandstone gateway, built by Thothmes III, and dedicated to the god Sebek, which dates, therefore, from 1600 B.C.

The temple was built on a broad terrace which ran along the river bank facing south. On this terrace were a propylon and a small temple built by the Roman Emperor Domitian, about A. D. 83, whose cartouches appear on the walls. They are written in a peculiar hieroglyphic form, and read : ‘ Domitianus who defendeth.’

Near to the temple of Domitian are the ruins, now in a very fragmentary state, of a small sacred building, which, from the inscriptions, appears to have been built by or for Ptolemy IX, or Euergetes II, about 146 B.C.

The sculptures which remain from this edifice show that it was one of those structures peculiar to Egyptian religious architecture, called ‘ the Mammisi,’ or ‘ Birth House,’ a building which commemorated the ‘ Divine Birth of the King.’

The Mammisis, in the form in which we find them at Philæ, Edfu, Abydos, Esneh and Kôm-Ombos, were essentially of Ptolemaic or Roman character, although their origin can be traced back to the representations depicted in the Egyptian temples of the eighteenth dynasty, 1600 B.C., which represent the birth of the king or queen as the divine offspring of Amen-Ra. Such representations are found on the walls of the Theban temples of Deir-el-Bahari, built by the great Queen Hatshepsu, 1600 B.C., and of Amenophis III, at Karnak. The scenes there depicted show the visit of the god Amen-Ra in human form to the queen-mother, the accouchement of the queen attended by Hathor, and the presentation of the child to his divine parents.

The Theban birth sculptures have a regular historical sequence, and tell a somewhat complete story, but the Ptolemaic 'Birth House' belongs to a period when the religious cults in Egypt were very confused and often mixed with Greek ideas and symbolism, which renders them very difficult of explanation.

The sculpture of special interest in the 'Birth House' at Kôm-Ombos represents a seated deity, who forms the central figure (Fig. 1). Unfortunately the head is missing, but, judging from other fragments of sculpture in the vicinity, it may be reasonably assumed to represent the hawk-headed Heru-Ur. Behind him stands a perfect figure of a female deity, with one hand uplifted, and in the other holding the *ankh*, the Symbol of Life.

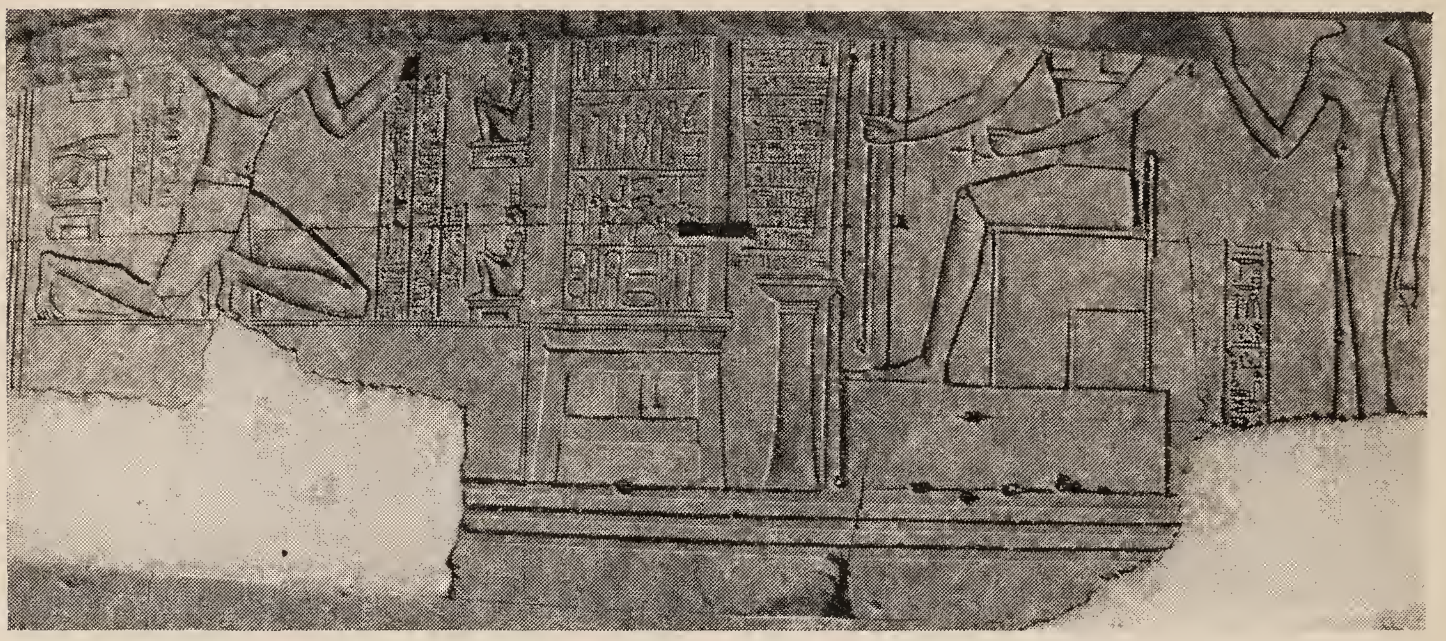

FIG. 1. Sculptured wall in the Birth House at Kôm-Ombos, showing a surgical instrument cabinet in the centre.

This undoubtedly represents Isis, as the long three-lined inscription in the centre of the tablet is addressed to that goddess.

Before the seated male divinity is a tall incense burner and a table altar. In the left-hand portion in front of the latter is a greater figure, probably representing a kneeling king, who wears a peculiar girdle about his waist, the ends of which terminate in the heads of Uræi serpents. He kneels before two shrine-shaped altars, on which are seated figures of Isis and Nephthys. Behind him is a similar shrine-shaped altar on which stands a large Utchat Eye, which has a figure of the Hawk of Horus on the lower lash. In front of this is an inscription, the translation of which reads: 'Making his way to the House of Joy. These are the words.' Followed by the second: 'All power and life around him, like Ra eternally.'

The important and most interesting part of the sculpture, from a medical point of view, however, is the altar in front of the seated deity, on which stands an upright panel, divided into four compartments or divisions (Fig. 2). This panel is probably intended to represent a surgical instrument cabinet, each compartment of which contains a number of gynæcological instruments, which were employed in midwifery in

Ptolemaic times. That these instruments are not strictly Egyptian may be gathered from the fact that the tablet and sculpture probably do not date back further than about 150 B.C., but that they are of an extremely interesting nature may be judged from the following detailed description.

Although we have but meagre evidence of surgical instruments being used in obstetrics in ancient times, there can be little doubt that these sculptures depict the instruments used at accouchements by the Græco-Roman accoucheurs of the period, and probably also by Egyptians under Græco-Roman influence.

Beginning with the top compartment from the left-hand side, the instruments appear to be :—

First Division.

1. A bifurcated probe.
2. A spoon.
3. A knife, for cutting the umbilicus.
4 and 5. Probes.
6. A cautery.
7. (Above). A bifurcated probe.
8. (Below). A pessary. (At this period pessaries were made of horn, ivory, bone or bronze.)
9. A saw.
10. A cautery.
11. A bandage or roll of linen, used for swathing or binding the infant. This swathing bandage is an interesting emblem, which is often figured in connexion with Ta-Urt, or Thoueris, the 'Hippopotamus goddess,' who was the Egyptian protectress of pregnant women.
12. Possibly a vaginal speculum.
13. Curved retractors.

Second Division.

1. (Horizontal). A bifurcated probe with hooked end.
1 A. Unidentified.
2 and 3. Traction hooks or decapitators.
4, 5 and 6. Scalpels.
7. Appears to represent a pair of obstetric forceps, and is of special interest, as no specimens of Greek forceps of this character are known. It has been doubted that the Greeks ever used instruments in cases of difficult labour, but Adams, commenting in a note on Paul of Ægina, states: 'Though they, the Roman and Greek writers, do not mention the forceps, Avicénna does so, and says that a forceps was dug up in the house of an obstetrix at Pompeii, bearing a considerable resemblance to the modern forceps.' The sculptured representation will be noticed to bear a very close resemblance to forceps that were in use a few years ago.
8. A cranioclast or forceps for crushing the head.
9. A pointed spatula for incising the head.
10. A drill for excising a piece of bone from the skull.
11. A curved knife.
12. Unidentified.
13. Unidentified.

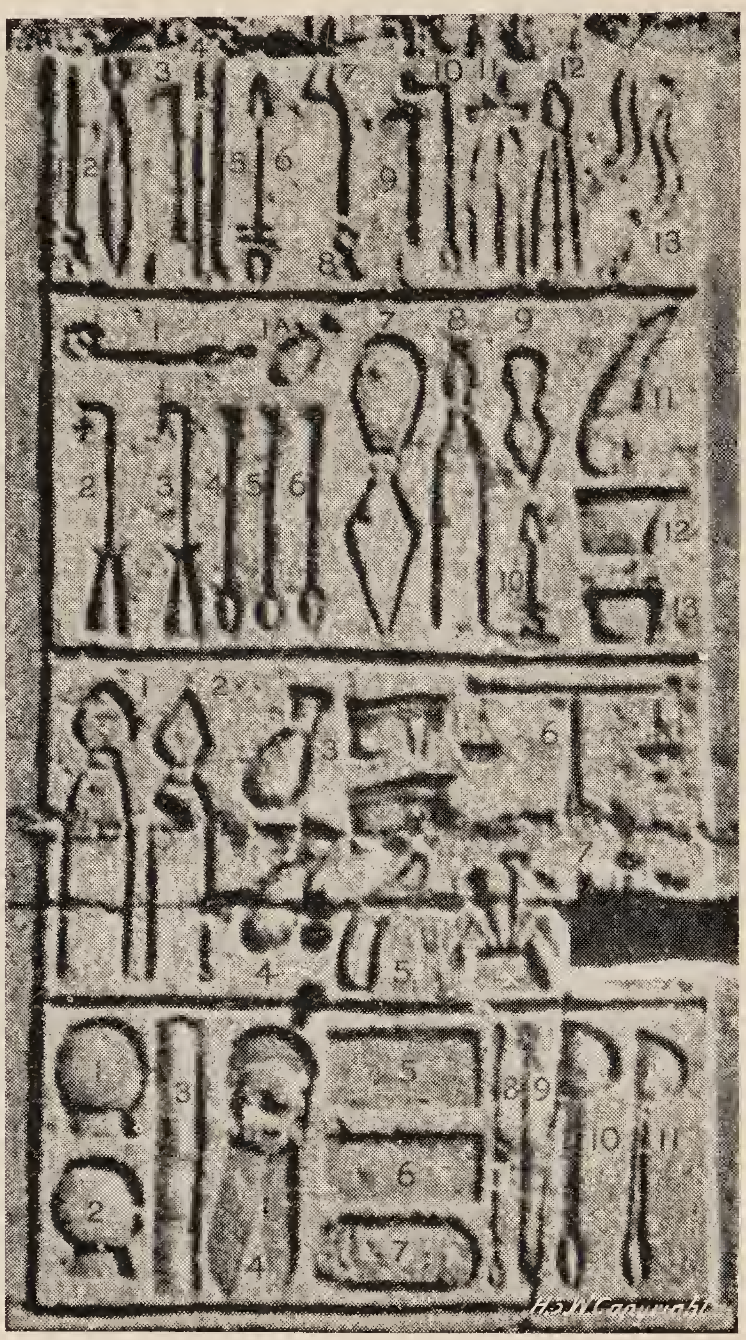

FIG. 2.

Third Division.

1 and 2. Cranioclasts or forceps for crushing the head.
3 and 4. Two very interesting objects, consisting of bags or vases, each of which is placed near a Utchat Eye. These are believed to represent drugs or unguents, called 'Utchat,' or 'the Eye of Horus,' which may have been symbolic of an ointment for application to the eyes of the infants.
5. (Beneath the Utchat eyes). A strigil, which may have been used as a uterine curette.
6. (Above). A weighing balance.
7 and 8. (Below). Two plants, probably representing those used medicinally in obstetric cases.

Fourth Division.

1 and 2. Cupping vessels.
3. A portable case for surgical instruments.
4. Shears.
5 and 6. Two oblong tablets unidentified.
7. A sponge.
8 and 9. Probes.
10 and 11. Scalpels.

The long inscription over the incense altar in front of Heru-Ur, or Aroueris appears to be a list of offerings or products brought at the time of the accouchement from various cities. Translated it reads :—

'. . . the House of Hapi (the Nile).
One half henen-Suten (Heracleopolis).
Half and . . . cloth (?) or wax (?) of the House of Spirit of Mendei.
One third (of) the city of Annu (Heliopolis).
One eighth (of) Memphis.
One eighth (for) Pa or Het-Resi.
One fourth (for) Sessenu-Khemensi (Hermopolis).
One sixth (for) Neti.
One hundred and twenty-eighth part (for) Abdu (Abydos).'

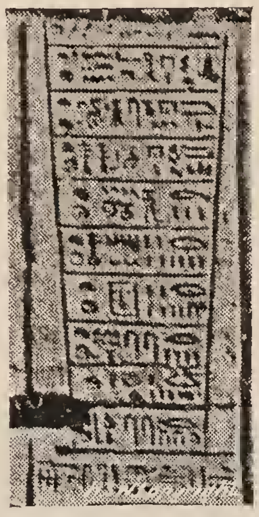

FIG. 3.

This would seem to be an inventory of some special offerings, probably to the god Heru-Ur at the time of the birth, but owing to the inscription having crumbled away and becoming partly obliterated, a number of the lines also being missing, it is impossible to make a complete translation. That the objects were offered, there seems little doubt from the short inscription incised between the seated god and Isis, which reads : 'May there be given to them in every place established in the Light of Ra (daily) in (before) their faces, gifts and offerings.'

So far as I can learn, we have, in this most interesting piece of sculpture, the only complete and authentic representations of instruments used in gynæcology in Egypt in Ptolemaic times.

An attempt has been made to reconstruct the instrument cabinet and to present models of the instruments in the Historical Medical Museum of the Congress in Wigmore Street.

I have not been able to discover any record previous to my photograph and identification in 1910 of this tablet, except a sketch by De Morgan, in which some of the objects are missing from the tablet. He does not appear to have identified the instruments.

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FIFTH CONGRESS

OF THE

FAR EASTERN ASSOCIATION
OF TROPICAL MEDICINE

SINGAPORE, SEPTEMBER, 1923

THE HISTORY OF MALARIA

AT

GEMAS

BY

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Senior Health Officer, Federated Malay States.

Kuala Lumpur:
Printed at Malayan Supply Co.

1923.

THE HISTORY OF MALARIA AT GEMAS.

Gemas is a railway Town situated on the Negri Sembilan side of the boundary separating that State from Johore. Its primary importance lies in the fact that it is a railway centre and a junction, but it is also an important customs station.

Topographically it consists of a flat valley bordered by low hills. The valley itself is approximately 50 chains long and varies in width from 8 to 12 chains, into it lead subsidiary valleys or ravines.

The valley, the ravines, and the slopes of the hills bordering on them have been cleared, the surroundings are jungle.

The soil is a yellow clay loam with here and there deposits of shale and laterite.

History of Malaria.

The malaria history of Gemas may be briefly described as a series of exacerbations and remissions corresponding respectively to periods of interference and non-interference with the local topography. That in this country there is some connection between disturbance of the soil and malaria has long been known. That the wave of disease following earth works is often of a temporary nature, disappearing by itself after a longer or shorter period has also long been recognised. The explanation given by road and railway engineers is that the opening of the earth sets free some gas supposed to be contained therein and that this causes the malaria. The weathering of the soil, they say, in some way sterilizes it, and is the reason for the disappearance of the disease.

The true explanation of the temporary rise is an increase in the malaria carrying anophelines consequent on the creation of conditions favourable for the propagation of the species. In the case of hill lands or undulating country, the opening up of jungle and the exposure to light of spring water favours *A. Maculatus* propagation as also does unpolluted water on fresh earth. *A. Maculatus* is the most potent carrier in Malaya.

The automatic subsidence of the wave of disease is due to conditions again becoming unfavourable for *Maculatus* propagation through [A] the drying or shading by vegetation of springs and spring water collections; [B] the weathering of the earth and the consequent change in the water covering it.

Stage I. 1905

Malaria follows opening of Railway Trace.

The history of Gemas commenced in 1905 when the virgin jungle was felled and the ground opened for the construction of the railway. All through this region of hills and dales the construction gangs suffered severely. The number of admissions to hospital and the number of deaths are known but the population figures prior to 1917 are not available and therefore figures only can be quoted, not rates.

Stage II. 1906

Improvement due to Nature.

In 1906 the line through Gemas was opened to traffic. At that time the only parts in the settlement which were not in dense jungle were the station yard and a patch of ten acres on the rising ground to the South where had been erected quarters for the staff. A small town of attap houses occupied part of the yard. Owing to the weathering of the earth overturned during construction, and the growth of vegetation over springs and pools, the incidence of malaria had abated, and the number of deaths had decreased to 13 for the year.

Stage III. 1907—08

Recurrence of Malaria following opening of Ravines and Development of Construction Work.

In 1907 the number of deaths from fever was fifteen. In this year a ravine immediately to the East of the residential area was cleared under the mistaken idea that the admission of light and air would bring about an improvement in the health. About the same time excavations for the Pahang line were started in the West of the town.

In 1908 the deaths from fever rose to 58 or nearly four times the number registered in the previous year. There appears to be no doubt that the rise in the death figures was due to the disturbance of the natural conditions and the subsequent multiplication of *maculatus* breeding grounds.

Stage IV. 1909-1919

Nature again brings about an abatement.

The ravine was allowed to grow up and the construction gangs moved further and further away as the construction of the line continued, leaving nature to eliminate the breeding places left behind. As the factors favouring the propagation of *maculatus* disappeared the fever subsided. A marked fall in the death figures occurred in 1909 and 1910. From 1911-1918 the health of the town called for little comment.

Stage V. 1917-1920

Malaria again follows Valley clearing and earthworks.

In 1917 commenced a scheme for filling and levelling the whole valley preliminary to the formation of a large marshalling yard. The hills were cut into exposing the subsoil water and causing the formation of seepages and pools on fresh earth. The scrub over the valley was cleared. Towards the end of the year fever cases became more numerous.

In 1918 the incidence rate was higher, and there was great difficulty in providing a staff sufficent to cope with the traffic work on the railway. Many developed malaria after a short stay and became incapacitated for varying periods of time. The place became very unpopular and few volunteered for duty there. A bonus of 25% on salaries was given to all and extra leave was allowed. In spite of this it remained unpopular. The population had become approximately 1,000. The admission rate to hospital for fevers was 94 per mille per month, the fever death rate was 14 per mille per year. Such is the nature of our calculations that a person entering hospital, (and there was no hospital in Gemas,) becomes a citizen of the town containing it after the lapse of one month. Many who contracted their fever at Gemas and who died from its effects spent more than a month in hospital previous to decease and were therefore not debited against Gemas.

The death rates shown are consequently less than the real ones. Again many of the Chinese refused to go to hospital and drifted to the large towns there to swell the death rate. The traffic department have kept a record of the sick days or days off duty caused by sickness. The percentage ratio of sick days to possible working days is an index of the amount of fever prevailing. In the first quarter the sick days percentage ratio was 8, in the second quarter 9, in the third 15, in the fourth 15.

The situation became so serious that the General Manager Railways requested the Government Entomologist to investigate and make recommendations for bettering the conditions in the town.

Stage VI.

The Government Entomologist investigates.

In August the Government Entomologist paid a visit of investigation and found—that the spleen rate was 52. 3%, the parasite rate 44. 7%, and the incidence rate 60%.

An anopheline survey was made and the following anopheline larvae were found :—

(*a*) In small open pools *maculatus*, *rossi* and *kochi*.

(*b*) In large open pools *aconitus*, *fuliginosus*, *sinensis* and *barbirostris*.

(*c*) In jungle covered pools *umbrosus*, *tessellatus*, *leucosphyrus* and *aitkeni*.

A. maculatus was found in the most inconspicuous places. In jungle covered ravines it was never found, but it was very prevalent wherever the valley had been cleared sufficiently to let in the light. Seepage areas made by excavations exposing the subsoil water were favourite breeding places and well populated.

A. umbrosus was common in shaded pools.

Among other recommendations the following were made :—

(1) That a staff competent to detect anopheline larvae be employed to keep the authorities constantly informed as to breeding places.

(2) That the engineers keep in mind the inconspicuous patches of water favoured by *maculatus* for breeding grounds.

(3) That wherever possible valleys and ravines should remain under their natural cover of thick vegetation.

(4) That in digging earth for filling purposes care should be taken not to expose the subsoil water.

(5) That swamp filling should commence at the inlets and not at the outlets.

Stage VII. 1919 and 1920.

Malaria increase due to further clearing.

In February, that is after a lapse of six months, the Entomologist paid a second visit. The following were the conditions found.

A staff competent to detect anopheline larvae had not been employed.

Under the mistaken idea that jungle *per se* was dangerous and that the letting in of light and air would sterilize the supposedly noxious water hidden there, the valleys, the ravines, and the flats had been felled. The trees had been left as they had fallen. Each ravine presented a tangled mass of timber and brushwood which allowed light to reach the water but which prevented the latter from getting away freely. The teachings of the Entomologist had been misinterpreted and conditions just the opposite of those advocated had been created. Already a change had occurred in the mosquito fauna. The comparatively harmless *aitkeni* and *leucosphyrus* had disappeared from the valleys and the very dangerous *maculatus* had begun to replace them. In the felled flat land *sinensis* and *barbirostris* had replaced *umbrosus*.

Vigorous oiling operations had been carried on by a railway gang inside railway reserves. The person in charge had no mosquito knowledge and he oiled wherever he saw water. Water in cuttings and excavations, on new fillings, and in open ponds and pools had been so well treated that no larvae of any kind could be found. Outside the railway reserve matters were different. In the tangled valleys drip cans were placed in the hope that mosquito breeding would thereby be rendered impossible. The hope was not realised. Seepage areas and springs on the banks received no oil, the wood tangle prevented oil from reaching many pools at the bottom.

All the valleys were within easy flying distance of the houses and an increase of malaria was predicted when *maculatus* became sufficiently numerous.

A first grade Sanitary Inspector to take charge of all oiling both inside and outside the reserve was recommended.

During the first part of the year the health of the traffic staff showed some improvement, probably due to oiling on the Reserve. In November and December the curve rose again. The number of fever admissions to hospital from all sources was higher than that of the previous year but the death rate from fever showed no increase.

In 1920 matters became much worse. The percentage of sick days to possible working days was in the first quarter 10, in the second 14, in the third 18, in the fourth 11. The hospital admission rate was nearly three times what it was in 1919 and the death rate was more than doubled.

In September a first grade Sanitary Inspector was seconded from the Health Department for general work in Gemas. The railway authorities however considered it inadvisable to place their oiling gangs under him. He died in November.

In November the General Manager Railways wrote "There is a great deal of sickness in Gemas, and in spite of all the measures we have taken to reduce it the position to day is as bad as ever". A request was made for the Senior Health Officer to visit the town and to report as to what further remedial measures could be undertaken.

Stage VIII.

Investigation by the Health Department.

In December the Senior Health Officer visited and investigated. He found that the subject was not being dealt with in a scientific manner. No mosquito surveys were being made and all anti-malarial work was being based on guess work. Certain non-dangerous areas were being heavily oiled and many highly dangerous *maculatus* breeding grounds were being missed. The following recomendations were made:—

(1) That the township of Gemas be treated as a whole and that there be no distinction between railway and town.

(2) That the preventive staff be placed under the Health Department and the curative staff under the Medical Department.

(3) That any major drainage works necessary, be done by a special engineer working in close co-operation with the Health Staff.

(4) That notice of proposed earth works be given to the Health Staff to enable them to take the necessary precautionary measures.

The recommendations were accepted and arrangements were made to carry them out.

Stage IX.

The Health Staff and Engineering Staff Co-operate.

1921. Early in the year operations commenced under the new scheme.

The Railway staff co-operated heartily with the Health staff and did everything possible to facilitate operations. An anti-mosquito brigade was established and placed under an Inspector conversant with the habits and life history of the local anophelines. Detailed mosquito surveys were made at frequent intervals and the breeding grounds of the different anophelines noted and flagged. The opened ravines were cleared of timber and brushwood and drained by open drains, small hollows were filled. All water likely to harbour anopheline larvae including that in the drains was oiled once a week with a mixture of crude oil and cheap kerosine.

The Railway engineer put in hand major drainage works in the valleys on the railway reserve, the Health staff providing the necessary entomological information and doing the anti-mosquito work necessary to prevent breeding going on while the work was in progress. The system adopted by the engineer was that which had proved successful in other towns in the F. M. S. viz a central open drain fed by underground contour pipes. The filling of borrow pits and the levelling of the ground in the central valley was accelerated.

The attention of the Health staff was chiefly directed towards possible *maculatus* breeding grounds for this mosquito was deemed to be the one chiefly responsible for the spreading of malaria in this district. The previous history of the place appeared to show that *umbrosus* had done little harm. Jungle therefore was left alone.

By the end of September all the dangerous valleys had been canalised by open drains. These drains were oiled weekly. By the end of the year the subsidiary valleys on the railway reserve had all been dealt with by major drainage works and the valleys on the other side of the line by minor drainage.

In the first quarter of this year the percentage sick days to working days was 7; in the second quarter 13; in the third quarter 10; in the fourth quarter 6. Hospital admissions remained high but the death rate had fallen.

STAGE X.

Success of Co-operative Scheme.

In 1922 filling operations in the main valley and canalisation of the main stream were the chief works. Oiling and upkeep by the Health staff continued as before. By the end of the year the greater part of the work on the main valley had been completed and a large recreation ground occupied the position of the former swamp.

In the first quarter of the year the percentage of sick to working days was 6; in the second quarter 5; in the third quarter 5; and in the fourth quarter 3.5. The admission to hospital had fallen in spite of the fact that a hospital had been opened at Gemas and that every person sick enough to be off duty was sent to it. The death rate from fever fell to 7 per mille or less than one third of that of the previous year.

The spleen rate among 105 children was 14.28%.

The 25% bonus had been withdrawn and also the extra leave. At the end of the year no sick could be found in the lines and enquires everywhere elicited the reply that the place had become healthy. The Health staff had been reduced to one third of its original strength and the oil to one ninth of the volume used when the new scheme commenced.

Nothing remained for the Railway to do but to complete the filling and canalisation of the main valley.

1923. Work is continuing on the main valley and all should be completed by the end of the year. The percentage of sick days to working days was for the first quarter 5, for the second quarter 3. The hospital is practically empty of cases and there is talk of closing it altogether. In August, of 40 children examined in the town school none had palpable spleens. Of 24 children examined in the railway coolie lines 3 had enlarged spleens, only one of which could be debited against Gemas. Many people ignore the advice of the Health Officer and sleep without mosquito curtains maintaining that there is no necessity as there are no mosquitoes. The white population state that there is now no fever.

Conclusions.

Gemas was made unhealthy by the creation of conditions favourable to the propagation of *A. maculatus,* the most potent of Malayan malaria carriers.

Under the mistaken policy that clearing of jungle is always an anti-malarial measure matters were made worse.

Oiling done by guess work failed to bring about improvement.

Drainage and oiling carried out on scientific principles and checked by frequent mosquito surveys brought about a marked abatement in the incidence of malaria and converted a fever stricken swamp into a healthy station.

Cost of Malaria at Gomas

Expenditure 1920	Expenditure 1922	Saving per annum.
Gomas allowance $20000	Nil	$20000
Oil 60 drums at $40 per drum $28800	7 drums at $40 actually $19=$3360	$25440
Oiling staff wages(48men) $7512	16 men = $2594	$ 5008
Medicines $1854	$ 364	$ 1490
Sick days traffic department at .W per day $7244	$3182	$ 4062
Lo s due to Gomas leave for traffic deaprtment $3000	nil	$3000
		$59000

~~and-at-oth~~The saving due to better health and better work both at Gomas and at other stations where sick from Gomas were sent is unknown.

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HANDBOOK OF THE
HEALTH EXHIBITS OF THE UNITED STATES NATIONAL MUSEUM

UNDER DIRECTION OF THE

SMITHSONIAN INSTITUTION

By CHARLES WHITEBREAD
ASSISTANT CURATOR, DIVISION OF MEDICINE, U. S. NATIONAL MUSEUM

INTRODUCTION

The plan for the development of the division of medicine included in its scope the subjects of hygiene and sanitation, but it was not until late in 1922 that this feature of the work was taken up with the hope of carrying it through to a successful completion.

The purpose of the hygiene and sanitation collection is to illustrate and describe those matters concerning personal and community cleanliness which should be known everywhere. To impress these health lessons, the Museum is using a method, the importance of which has always been realized by museums, and that is, teaching through the eye—visual education.

The first exhibits are classified under the heading, " the world we live in." In this section are exhibits illustrating what parasites are, how water is polluted, how to get pure water, waste disposal, fresh air (ventilation, housing, etc.), how pure milk is obtained, how insects transmit disease, how animals transmit disease, healthful farm surroundings, etc. The second part of the collection deals with the health of the people from the beginning of life to its end. This section is made up of exhibits showing the way life begins, care of the mother before the baby is born, care of the mother and child at birth, care of the baby before he goes to school, healthful school surroundings, diseases of children, what the public health nurse does, importance of play and recreation, care of the teeth, eyes, and feet, care of the child in school, sanitary school houses, what mental hygiene is, social hygiene, dressing for health, the adolescent period, early adult life, why we should be physically examined periodically, healthful working conditions, the value of first-aid and life-saving, dangerous diseases, etc.

The exhibits illustrated and described in the succeeding pages are located on the southeast court gallery, Arts and Industries Building, United States National Museum. (See fig. 1.)

HEALTH PROGRESS EXHIBIT

Hygiene and sanitation, like everything else—our language, mental conceptions, etc.—are the reward of long searching for light, and have been built up from generation to generation by one person finding out the errors of a predecessor and a third improving on both.

This exhibit, which is based on large charts arranged for demonstration purposes by Surgeon Charles F. Bolduan (Reserve), of the United States Public Health Service, is an illustrated story of the development of public health activities. The pictures used in the exhibit are so numerous that they cannot be shown here, but the legends are given, as they outline briefly and concisely the growth of hygiene and sanitation.

Fig. 1.—Arts and Industries Building, U. S. National Museum.

WHAT IS DISEASE?

In the earliest times a person who was sick was thought to be possessed of "evil spirits." This "demonic theory of disease" persisted until recent times, especially in the case of mental diseases. It constituted the American Indians' entire conception of disease.

Hippocrates (460-370 B. C.), the great Greek physician, called the "Father of Medicine," formulated the theory of the four humors, according to which disease was the result of an alteration in the proper proportion of blood, phlegm, black bile and yellow bile. This was the first attempt to explain disease in terms of body constituents.

Girolamo Fracastoro (1484-1553), an Italian, was one of the first to insist that certain diseases were spread by "seeds," which, carried from person to person, always reproduced their kind. This was the beginning of the germ theory of infectious diseases.

Antony van Leeuwenhoek (1632-1723) of Delft, Holland, studied, by means of a microscope which he made, and described minute living forms present in decaying matter, and paved the way for later advances in actually isolating the germs which cause various diseases.

Louis Pasteur (1822-1895), the distinguished French chemist, by his studies on fermentation definitely disproved the theory of "spontaneous generation." This cleared the way for the logical development of the modern microbic theory of infectious diseases.

Robert Koch (1843-1910), the "Father of Bacteriology," in 1882 formulated a series of requirements for proving the causal relationship of a particular bacterium to a disease. These served to put the germ theory of infectious diseases on a firm foundation.

HOW HOSPITALS DEVELOPED

In the earliest historic period, the sick were taken to the market place "that all who have had or seen the like distemper, may give them advice." This seems to have been the beginning of the hospital idea.

The ancients maintained, in connection with their temples, shelters for the sick who came to the priests for aid in appeasing or driving away the demons responsible for their sickness.

Credit for inaugurating the humane care of the sick belongs to Christianity. One of the earliest hospitals, consisting of shelters with houses for physicians and nurses, was established by St. Basil at Caesarea in 369 A. D.

Prior to the widespread occurrence of syphilis in the time of Columbus, hospitals made no attempt to cure disease. With the discovery that syphilis responded to treatment, they began to regard treatment as one of their functions.

After the 15th century interest in hospitals declined, and by the 18th century they were generally filthy and neglected. One out of every five patients died and few recovered from surgical operations. The insane, chained to the walls, were exhibited for a fee.

We owe our present hospital cleanliness and management to Florence Nightingale (1853) ; our great surgical achievements to Morton's demonstration of ether anaesthesia (1846), and Lister's discovery of antisepsis (1867).

THE DEVELOPMENT OF SURGERY

Skeletons found in ancient Babylonian tombs indicate that trephining the skull was practiced thousands of years before the Christian era. The ancient Hindoos appear also to have undertaken plastic surgery.

The teachings of Hippocrates (460-370 B. C.) on fractures, dislocations and wounds contain much sound surgery. The Hippocratic oath reminds us that certain operations nowadays regularly performed were once so dangerous that they were forbidden.

As late as the 16th century most surgery, such as it was, was left to the barber, whose rank naturally was much inferior to that of the physician. Because of the successful outcome of the surgical treatment of his fistula, Louis XIV, in 1686, raised his barber-surgeon to nobility and thus conferred a measure of dignity on the practice of surgery.

Except in fractures and dislocations, and in abscesses opening externally, surgical treatment was attended with great danger even as late as 1850. Most abdominal operations were fatal.

Modern surgical progress dates from the demonstration of anaesthesia by Morton in 1846; cleanliness by Florence Nightingale in 1853, and of the antiseptic method by Lister in 1867.

THE GOOD OLD DAYS

Among primitive people individual plates were practically unknown; all ate out of a common large pot or bowl.

Table forks were first introduced into England in 1608, but even toward the end of the 18th century few English noblemen owned more than a dozen. Most persons ate with their fingers.

It was formerly the custom at feasts to pass the flowing bowl, each guest drinking therefrom in turn. In many places persons still drink from the same tin dipper.

Who does not remember the time when flies, the great filth carriers, were permitted in all dining rooms, and it was not uncommon to find a fly in the milk pitcher?

In many homes, even at the present time, when the family " washes up " in the kitchen prior to sitting down to dinner, everyone tries to find a clean place on the roller towel.

BOONS TO MANKIND

The discovery of the virtues of opium is shrouded in mystery and obscurity. The relief of pain made possible by its use constitutes it an inestimable blessing.

The bark of the cinchona trees, called Peruvian bark, which was introduced into Europe in 1632 by the Countess Chinchon, wife of the Viceroy of Peru, is the source of quinine, that wonderful specific against malaria. It has undoubtedly saved much life and relieved an untold amount of suffering.

Smallpox vaccination, introduced by Edward Jenner, an English physician, in 1796, has practically wiped out this dreadful disease from civilized countries. The life-saving effect of this procedure is incalculable.

The discovery of anaesthesia and the demonstration of its practicability by W. T. G. Morton in 1846 robbed surgical operations of their tortures, and laid the foundation for modern surgery.

Though surgical operations had been robbed of their pain by the discovery of anaesthesia it was not until 1867 that Lord Lister made operations safe by introducing the antiseptic method.

Prior to the discovery of diphtheria antitoxin by Emil von Behring in 1894, diphtheria everywhere caused a large number of deaths among children.

The successful outcome of Paul Ehrlich's patient investigations leading to the production of 606 (salvarsan) in 1910 has furnished an effective remedy against syphilis, one of the world's greatest plagues.

DEVELOPMENT OF DIAGNOSTIC METHODS

Hippocrates, a famous Greek physician (460-370 B. C.), was the first to discern, isolate and relate to one another the symptoms of diseases, so that from his descriptions such diseases became clearly recognizable.

Leopold Auenbrugger (1722-1809), a distinguished physician, active in Vienna during the latter part of the 18th century, in 1751 devised and tried out the value of percussion in the diagnosis of diseases of the chest.

René Théophile Hyacinthe Laennec (1781-1826) devised the stethoscope, and by his work with this instrument furnished a solid foundation for diagnosing diseases of the heart and lungs by means of the ear.

Richard Bright (1789-1858), a leading physician in London, in 1827 established the connection between the presence of albumin in the urine and certain peculiar changes in the kidneys. This observation was of immense importance in medical practice.

Rudolf Virchow (1821-1902), for years head of the pathological institute in Berlin, and the founder of the modern cellular pathology (1858), inaugurated the present methods of microscopical diagnosis of tumors. He was also the first to observe and define "leucocytosis," a discovery used daily in diagnosis by means of blood examination.

Carl R. A. Wunderlich (1815-1877), a professor of medicine in Leipzig, in 1868 published a treatise on the relations of animal heat in disease. This marked the introduction of the clinical thermometer as an indispensable diagnostic instrument.

Hermann von Helmholtz (1821-1894), by his invention of the ophthalmoscope in 1851, made ophthalmology an exact science and armed physicians with an instrument of the greatest value in diagnosis.

Robert Koch, with Pasteur the founder of modern bacteriology, by his numerous discoveries and observations contributed greatly to the present methods of accurate diagnosis of infectious diseases by means of bacteriological examinations.

Heinrich Quincke in 1895 introduced the procedure known as "lumbar puncture" now regularly used not only for examining the spinal fluid, but also for the diagnosis and treatment of nervous diseases.

The discovery of x-rays by Wilhelm Konrad Roentgen in 1893 marked an important advance in diagnostic methods and contributed greatly to further advances in surgery.

Fernand Widal, a French clinician, adapting the results of observations on blood serum previously reported by Gruber, in 1896 introduced the serum diagnosis of typhoid fever which is now part of examinations in suspected cases of that disease.

August von Wassermann, a German bacteriologist, adapting the results of observations previously made by Bordet, in 1907 devised the ingenious method of examining the blood and spinal fluid in cases of suspected syphilis.

WATER AND HEALTH

Ruins of elaborate systems of reservoirs, aqueducts and fountains testify to the attention given to water supplies by the ancients.

In the 16th century famous English physicians warned against drinking water: "To young men that be of hot complexion, it does less harm, but to them that are feeble, old and melancholy it is not convenient."

During the 17th century distinguished physicians thought it was harmful to drink water. We now know that the water supplies of those days were greatly polluted. The great English physician, Thomas Sydenham, thought water could be safely drunk in moderation.

In the Orient many outbreaks of cholera have been traced to drinking polluted water. The pilgrimages to the holy Ganges in which the pilgrims bathed in enormous numbers have caused repeated severe epidemics. In this country the principal water-borne disease is typhoid fever.

Piping the water directly into the home is of recent origin. In ancient times a system of public fountains and later "town pumps" constituted the prevailing system of water supply.

With the revival of sanitation in the 19th century, attention was given to the purification of polluted water supplies. Storage and sedimentation do much to purify a water supply. The action of sunlight is also an important purifying factor. Sand filters first came into use in England in 1829.

In recent years water supplies have been purified by means of chlorine. At first it was used in the form of "chloride of lime," but now liquid chlorine is generally employed.

SAFE DISPOSAL OF HUMAN EXCRETA

Centuries before Christ, the Babylonians had developed elaborate systems of sewerage and made use of water drains for carrying off human excreta. All this was forgotten in the dark ages.

Up to about 1200 A. D., Europe reeked in filth. In the cities heaps of excrement filled the nooks, court yards and spaces between the houses. The filth was removed in open carts and used on farms as fertilizer. This use of excreta still prevails in some countries.

With the revival of sanitation during the 16th century, greater attention was given to the construction of pits, privies and cesspools. Later the dry earth closet came into use.

In 1596, Sir John Harrington, a friend of Queen Elizabeth, devised the "water closet" as a sanitary method of removing excreta. However, this cleanly contrivance did not come into general use until two hundred and fifty years later.

HOW SMALLPOX WAS CONQUERED

Up to 1800 A. D., smallpox was one of the children's diseases and was everywhere as prevalent as measles is nowadays. It caused a large proportion of all deaths. Those who escaped were pockmarked for life.

In 1721, Lady Mary Wortley Montagu, who had resided in Constantinople, introduced into England the practice of " inoculation," which consists in the transfer of smallpox virus from fresh pustules of a smallpox patient to the persons to be protected.

Inoculation usually produced a mild attack of smallpox, and this conferred immunity. Sometimes the inoculated person developed severe smallpox and died. Moreover the practice served to spread the disease.

In 1796, Edward Jenner, an English physician, introduced the practice of inoculating persons with cowpox, a mild disease related to smallpox. This process, now familiar to all under the name " vaccination," is thoroughly safe and is an effective protection against smallpox.

MALARIA—PAST AND PRESENT

Malaria was prevalent in ancient Egypt, Greece and Rome, and mosquito canopies were in use. It is not believed, however, that the rôle of the mosquito in transmitting malaria was understood.

There is reason to believe that the decay of the Greek civilization which reached its height during the age of Pericles (461-430 B. C.) was primarily due to the ravages caused by malaria, introduced through slaves from Africa.

For centuries it was believed that malaria was caused by " bad air " (whence the name), especially that coming from marshes and other damp places. The disease is a great scourge throughout a large part of the world.

In 1880, Alphonse Laveran, a French army surgeon, discovered the malaria parasite in the blood of infected persons. How it got there was not yet known.

In 1898, Ronald Ross, an English army surgeon stationed in India, showed that the malaria parasite is conveyed through the bite of mosquitoes, and that the parasite undergoes changes in the body of the mosquito.

The successful application of our knowledge of malaria was demonstrated by the remarkable work of William C. Gorgas and his collaborators in making the Panama Canal Zone a healthful place in which

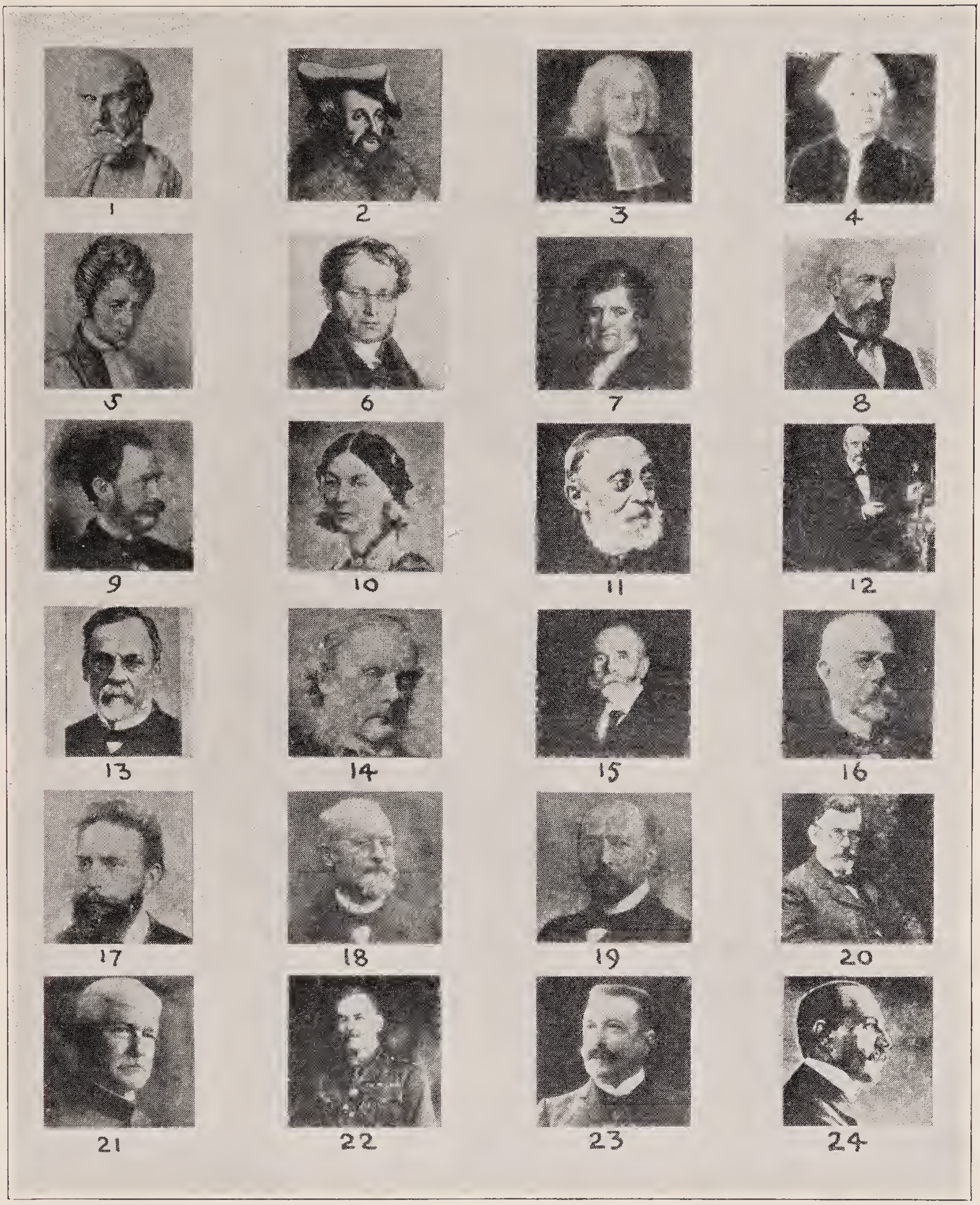

FIG. 2.—Famous characters in the history of curative and preventive medicine.

1. Hippocrates.
2. Girolamo Fracastoro.
3. Edmund Halley.
4. Leopold Auenbrugger.
5. R. T. H. Laennec.
6. P. C. A. Louis.
7. Richard Bright.
8. C. R. A. Wunderlich.
9. W. T. G. Morton.
10. Florence Nightingale.
11. Rudolf Virchow.
12. H. von Helmholtz.
13. Louis Pasteur.
14. Joseph Lister.
15. Heinrich Quincke.
16. Robert Koch.
17. W. K. Roentgen.
18. Alphonse Laveran.
19. Emil von Behring.
20. Paul Ehrlich.
21. Wm. C. Gorgas.
22. Ronald Ross.
23. Fernand Widal.
24. August von Wassermann.

to live. Without this the construction of the canal would probably have been impossible.

HOW MALARIA IS CONTROLLED

Prevent the breeding of mosquitoes by ditching and draining swamps, covering the surface of streams and ponds with crude oil, filling in smaller ponds, or stocking ponds with fish which feed on mosquito " wigglers."

Protect persons against the bites of mosquitoes by properly screening the home, killing mosquitoes which despite screens may have entered the house; keeping within a screened house during the evening when the mosquitoes are most apt to bite.

Treat malaria patients with quinine in order to kill the malaria parasites and to reduce the number present in the circulating blood, so that a biting mosquito will not be able to obtain any to pass on to another person.

Give daily doses of quinine during the malaria season to all non-infected persons, so that any parasites introduced by the bite of an infected mosquito may at once be destroyed by the quinine present in the blood.

HOW TYPHOID FEVER IS SPREAD

Municipal water may become infected; many such supplies are still not adequately safeguarded. Tourists often contract typhoid fever during their summer vacations by drinking from brooks and springs which are polluted with human excreta.

Before pasteurization of milk supplies was enforced, epidemics of milk-borne typhoid fever were common. Typhoid fever germs often get into milk through carelessness or lack of cleanliness upon the part of those who handle it. Flies sometimes infect it when it is left uncovered.

In rural districts most cases of typhoid fever can be traced to the improper disposal of human excreta. An unpleasant topic for discussion, but one of the most important problems for the people of this country to consider.

Flies carry filth wherever they go. In small towns and country districts where insanitary privies abound, flies carry infection from the privy to the kitchen and dining room.

Five per cent of those who have had typhoid fever continue to harbor living typhoid bacilli in their excreta. Such persons are " typhoid bacillus carriers " and may spread typhoid fever, especially when they prepare or handle food for others.

HOW TYPHOID FEVER IS CONTROLLED

Watersheds should be under sanitary supervision. Sewage should be kept out of drinking water. Polluted drinking water should be filtered and disinfected. Wells and cisterns should be protected against filth. In emergencies, suspected drinking water should be boiled.

Dairy farms and milk dealers should be under sanitary supervision. No sick person should handle milk sold to the public. Except for " certified " or " guaranteed " grades, all milk supplies should be effectively pasteurized.

No persons who have ever had typhoid fever should engage in occupations in which they handle or prepare food for others (cooks, dairymen, etc.) unless an examination has shown that they are not typhoid carriers.

Laboratory facilities should be provided for the prompt and accurate diagnosis of the disease. Effective precautions should be taken in all cases even remotely suspected to be typhoid fever. To prevent spreading the disease to others, the patient should have adequate expert nursing care in the home, or better still should be sent to a hospital for such care.

The safe disposal of human excreta is important. Where a modern flush closet cannot be provided, the out-door privy must be fly-proof and be of the sanitary type.

HEALTH AND LEGISLATION

Obedience to the health principles contained in the laws of Moses (Leviticus and Deuteronomy) would have done much to control the many epidemics which ravaged Europe during the middle ages. Apparently these wise laws were entirely disregarded.

During the dark and middle ages drastic and inhuman laws were enforced against lepers. These laws, however, practically rid Europe of this dread disease.

In 1386, Venice, threatened by the " Black Death " (plague), enacted laws providing detention and isolation of all persons from infected ports for a period of forty days (*quaranta giorni*). This is the origin of quarantine methods.

During the 19th century, the revival of interest in public health led to much important health legislation, including the compulsory reporting of births and deaths, the notification of infectious diseases, the supervision of communicable diseases, etc.

PROGRESS IN HEALTH BOOKKEEPING

Hundreds of years before Christ, enumerations of people were made for purposes of taxation and other reasons. One of the earliest recorded censuses is found in the Bible, Numbers I to IV.

There are practically no vital statistics prior to the 16th century. In 1662, Captain John Graunt compiled the "bills of mortality" of London, and directed attention to the importance of collecting and studying such information.

In 1693, Edmund Halley, the discoverer of Halley's comet, compiled a table showing the expectation of life at various ages. This epoch-making work laid a scientific foundation for life insurance.

Owing to the constitutional provision relating to representation, a census has been taken in the United States every ten years since 1790. This is earlier than in any other country.

Pierre Charles Alexander Louis (1787-1872), the great French physician, was the first to urge the use of statistical methods in studying diseases, especially as to the effect of treatment.

Formerly births and deaths were recorded only in the church registers and were very incomplete. Through the efforts of the United States Census Bureau the states have gradually adopted uniform registration laws, and have standard certificates of birth and death.

PRECIOUS LIVES NEGLECTED

Among primitive people child life was held cheap, and twins were killed or neglected. Among some tribes it was lawful and customary to destroy the weaker twin child irrespective of sex.

The Spartans, if they found the infant puny or ill-shaped, ordered it to be abandoned in a pit beyond the city walls, They thought it good neither for the child itself nor for the public interest that it should be brought up.

The early Roman laws, ascribed to Romulus, sound the first humane note, enjoining citizens to bring up all healthy male children and at least one female child, and to allow children to live until they were three years old, unless they were lame or monsters.

During the middle ages the church established foundling asylums in various parts of Europe. In 1331, in Nuremburg, there was founded the first hospital where infants could be left and women could be attended during childbirth.

The cruelty and neglect visited on orphans and foundling children, even as late as the 17th century, led Saint Vincent de Paul to establish a refuge for them in Paris in 1638. His work did much to renew public interest in child welfare.

SAVING CHILD LIVES

In 1876, the health authorities of New York City organized a special corps of physicians to visit tenement homes during the summer months, and treat all babies found sick. This work continued for years without doing much to reduce infant mortality.

In 1884, Morel de Villiers, mayor of a French village, inaugurated the first effective plan for saving infant lives. It included prenatal care, skilled attendance in childbirth, encouragement of breast nursing, training in child care, financial assistance if needed, etc.

In 1900, health authorities in various parts of the world began to devote attention to keeping babies well by medical supervision, education of mothers, improvement of milk supplies, and necessary special service in the homes.

The basis of modern infant hygiene activities is the proper notification of all births to the proper authorities. In 1915, only ten states in this country enforced effective birth registration laws. In 1921, there were twenty-five states.

Morel de Villiers' plan embraces the notification of pregnancy so that adequate medical care and supervision can be insured to expectant mothers. In this country such notification is not yet included in the work of administration authorities.

LIVES ARE LONGER AND SAFER

At the close of the American Revolution a baby born here could reasonably expect to live to be thirty years old.

In Lincoln's time, out of every one hundred babies born in the United States twenty died before a year had passed.

When the United States was one hundred years old, a baby born here could reasonably expect to live to be forty years old.

At the present time a baby born in the United States may reasonably expect to live to be fifty-eight years old. Now less than ten babies out of every hundred born die in the first year, and in many towns less than half that proportion die.

DISEASE PARASITES

This exhibit consists of a series of enlarged representations of parasitic enemies of mankind.

Parasitism.—The condition of infestment of some form of life by another living organism—usually of lower order—is known as parasitism. When a parasite lives on the surface it is called an ectoparasite.

Examples: Fleas, lice, etc. When a parasite inhabits the internal structure of an organism it is known as an endoparasite. The invaded organism is called the host. Parasitism is of three kinds. True parasitism is a condition in which the parasite harms the host, and derives all the benefit from the association. The hookworm is an example of this kind of parasitism. The second kind of parasitism is called mutualism, in which there is mutual benefit to the parasite and its host. For instance, the colon bacilli are furnished a suitable habitat in the intestines, and in return protect the host against strictly pathogenic bacteria. Then there is a kind of parasitism known as commensalism, in which there is benefit to the parasite but no injury to its host. Parasites of man are vegetable and animal.

Vegetable parasites.—The chief forms are the schizomycetes or bacteria, the blastomycetes or yeasts, and the hypomycetes or molds. The type specimens of vegetable parasites shown in this exhibit are bacteria, which are microscopic forms of life, each individual consisting of a single cell of simple structure. They reproduce by fission—division into parts. Some have power of locomotion and others do not. Bacteria are divided, on the basis of their morphology (shape), into three groups, as follows: Cocci (spheroid microorganisms), bacilli (rod-shaped), and spirilli (coil-like). Bacteria are found almost everywhere and are of vast importance to mankind. Unnumbered thousands of species are beneficial, or at least harmless. Of these, many exist in the soil and through their action the surface layers are rendered fertile and capable of producing crops. Others act as the scavengers of nature and reduce all kinds of dead organic material into simple chemical substances available for use by plants. Bacteria and the closely related organisms—the yeasts and molds—are responsible for all fermentation and decay. Harmless bacteria are found in water, milk and many other articles of food, under the finger nails, on the membranes of the air passages and in all parts of the digestive tract. The property of bacteria which deeply concerns mankind is the production of diseases, many of which are due to certain forms, called "pathogenic" bacteria, in contradistinction to others which do not have this tendency and are called "nonpathogenic" bacteria.

The following pathogenic endoparasites are shown in the exhibit to illustrate the morphology of bacteria: *Bacillus pestis,* the specific cause of bubonic plague; *Bacillus tuberculosis,* the specific cause of tuberculosis; *Bacillus typhosus,* the germ of typhoid fever; *Gonococcus,* which causes gonorrhea (urethritis); and the *Spirochaeta pallida,* the pathogenic parasite of syphilis.

Animal parasites.—The important classes of animal parasites in man are the Protozoa, the worms, and the anthropods. Pathogenic influences are exerted and anatomical changes and symptoms of varying intensity are produced by some animal parasites just as in case of infection by pathogenic bacteria. The movements of the internal parasites of this kind produce inflammatory effects, and their presence in large numbers creates the possibility of tissue destruction, pressure atrophy, secondary degenerations, obstruction of blood and lymph vessels, etc. The abstraction of food from the host is not necessarily a serious consideration, but it and the other factors mentioned may exert marked and deleterious effects upon the infected person. Of the anthropods the important ones are the mites, ticks, lice, fleas, and flies.

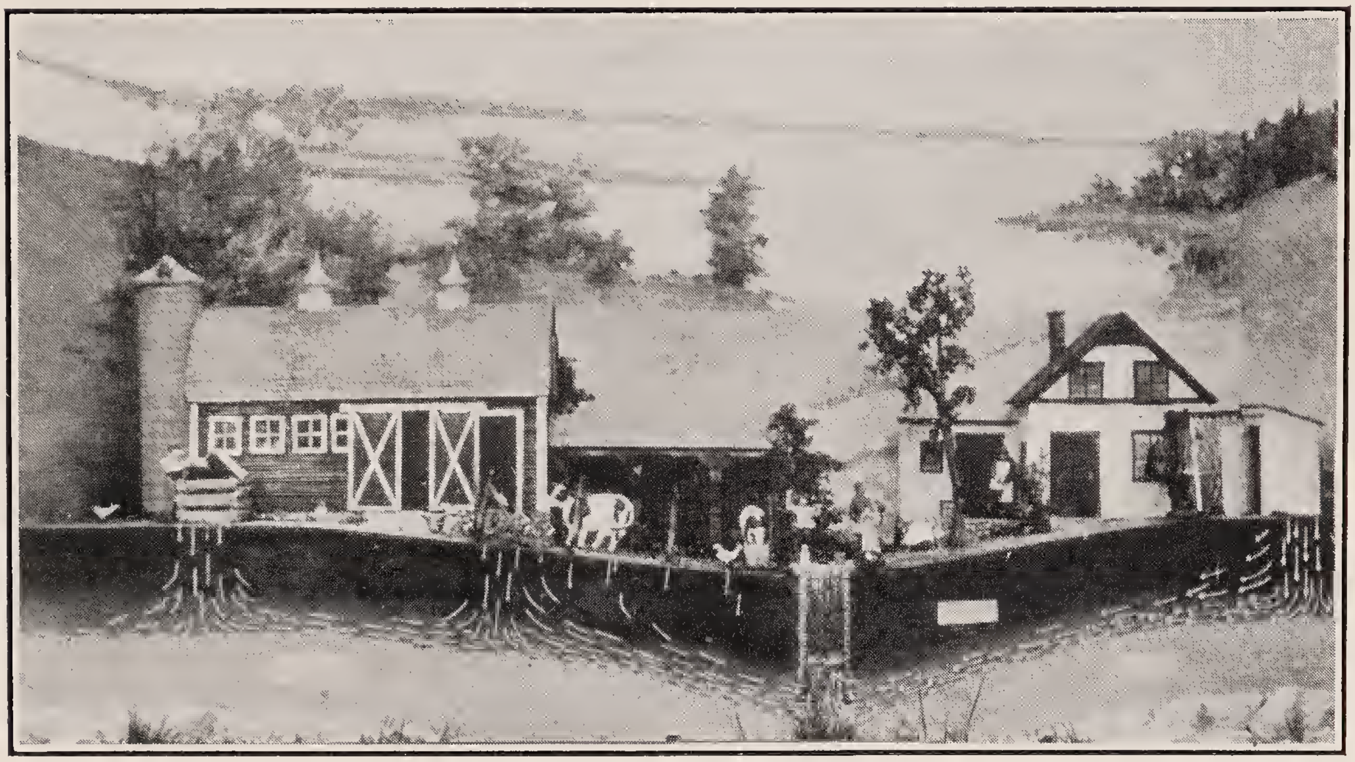

Fig. 3.—Pollution of a well.

WATER

Water must be pure or it is likely to be as much of a curse as a blessing. Because the microorganisms of certain diseases are found in water these diseases have been designated " water-borne diseases." They are typhoid fever, paratyphoid fever, cholera, and dysentery. The microorganisms which cause these diseases are present in human excrement, and water is polluted when this waste matter is carelessly or accidentally permitted to enter wells or other sources of supply.

Pure water is so necessary to life and so seemingly harmless that hygienic advice regarding it is usually summed up in the admonition to drink plenty of it. For the average individual not engaged in active labor, three pints of water a day are considered sufficient apart from that taken in the food. This should be modified according to the temperature, humidity and the bodily activity. The question of health largely depends upon the water consumed, in which may reside the microorganisms of disease and death. In cities and towns the purification of water is taken care of by the sanitary officials, the water being subjected to purification by the sunlight and air, filtration through sand, coagulation, chlorination, etc. In rural districts great care must be taken to locate, construct, and operate the water supply so that it will be free from human and animal filth. Figure 3 pictures a museum exhibit of a rural home with an improperly located well. This well is placed where it receives the drainage from the out buildings, and consequently is a great menace to health.

All varieties of water contain organisms, many of which do not seem to be detrimental. The water population is a mixture of forms structurally of high and low degree, large and small, animal and vegetable. Everyone is familiar with some of the larger forms of plant and animal life which inhabit ponds, streams and lakes. The microscopic organisms are numerous but not so well-known. They play a part in giving color to water, and when they decay in great numbers also impart to the water an unpleasant odor and taste. Enlarged glass models of some of the small organisms of water are shown in figure 4.

RURAL SANITATION

Health authorities have accomplished wonders during recent years in awakening public interest to the necessity of community cleanliness. Great strides have been made toward bettering the sanitary status of towns, villages and rural communities, but even as late as 1917 Surgeon L. L. Lumsden, of the United States Public Health Service, in a paper entitled "A Sanitary Privy System for Unsewered Towns and Villages," reports gross carelessness and neglect on the part of citizens to protect their own and the community's health, as follows:

> . . . . In the three years 1914-1916, the United States Public Health Service made an intensive sanitary survey of a group of 15 fairly representative counties. . . . In these counties 72 incorporated towns or cities are located. These centers of population appeared at the time of the survey to present about average sanitary conditions for the American towns and cities ranging in population from 500 to 20,000. Only one of them . . . . was found to be free from grossly insanitary privies. Among the others the percentage of homes at which insanitary privies were in use ranged from 10 to 100, and for almost all of them the percentages were much nearer 100 than 10. . . . .

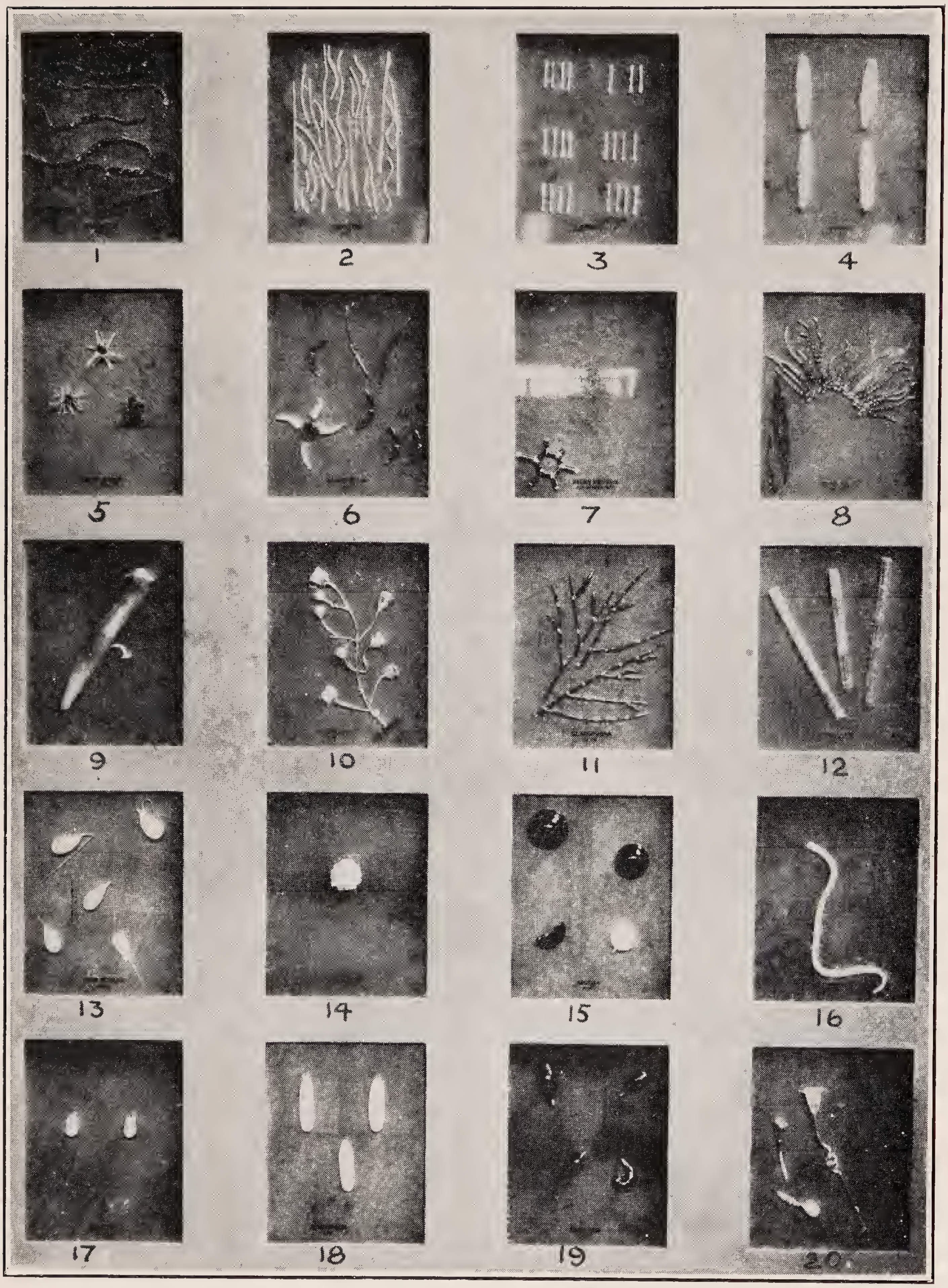

FIG. 4.—Microorganisms of water.

1. Anaboena.
2. Beggiatoa.
3. Asterionella.
4. Navicula.
5. Staurastrum.
6. Closterium.
7. Hydrodictyom.
8. Rivularia.
9. Planaria.
10. Carchesium.
11. Cladophora.
12. Spirogyra.
13. Bodo saltans.
14. Difflugia.
15. Arcella.
16. Limnodrilus.
17. Colpidium.
18. Paramecium.
19. Euglena.
20. Vorticella.

From insanitary privies infection may be spread by hands, by chickens, dogs, rats, and other animals, by flies and other insects, and by surface washing or subsoil seepage so as to reach food and water. Typhoid fever, hookworm disease, Asiatic cholera, dysentery and diarrhea may be traced, in many instances, to the insanitary disposal of human excreta.

Unsewered towns and villages are giving more attention to this important matter by encouraging or enforcing the construction of sanitary, fly-proof privies. Types of sanitary privies, approved by federal and state health authorities, are pictured in figure 5.

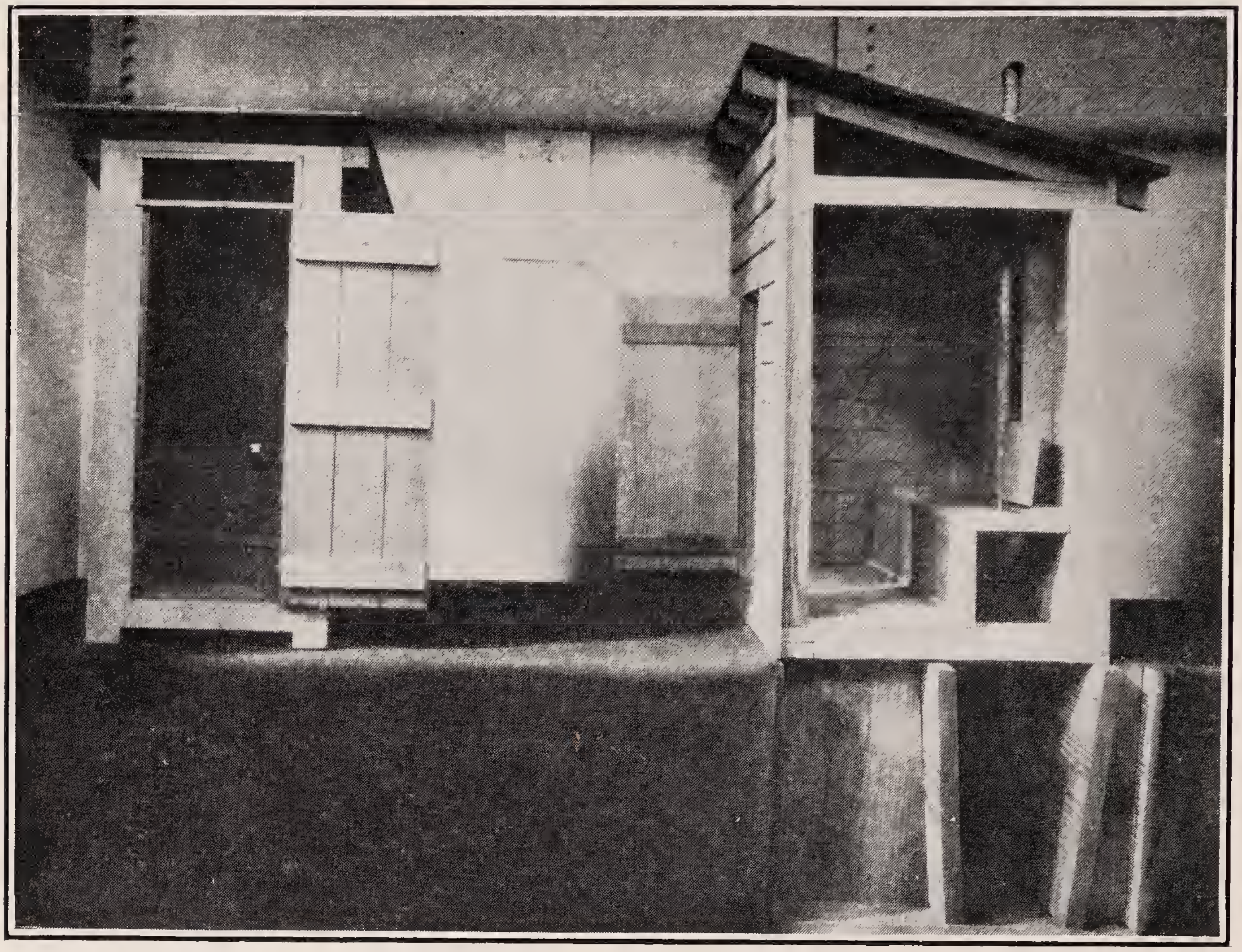

Fig. 5.—Sanitary dry closets.

SEWAGE DISPOSAL

The cities and large towns, which it seemed because of density of population had an insurmountable task in the matter of community cleanliness, have outstripped less thickly inhabited districts in many sanitary problems, especially the disposal of wastes. Ways and means of disposing of sewage have been developed to a point where it is easier for large cities to remove injurious nuisances, than it is for a single family to dispose of garbage, excreta, and other wastes.

There is pictured in figure 6 the sewage disposal plant which the city of Milwaukee, Wisconsin, constructed on Jones Island at a cost of $10,000,000, to dispose of its sewage, and trade wastes from industrial works, factories, etc. A model of this plant was added to the Museum's health collection. Prominent in the model is the power house for the operation of the plant, the screen house, the aeration and sedimentation tanks, the filter and dryer house, and the dry sludge storage building. In addition to the model there are exhibited a number of photographs of the interiors of the buildings showing the machinery and the intercepting sewers. The process is made more graphic by three bottles, the first showing raw sewage as it enters the plant, the second showing the clear effluent that flows into the lake with an average reduction of 98 per cent bacteria and 97 per cent suspended matter, and the third showing the sludge which is used as a fertilizer. The plant serves an area of 96,800 acres with a population of about 575,000. About 100 tons of fertilizer are produced daily, and sells for about $20.00 per ton.

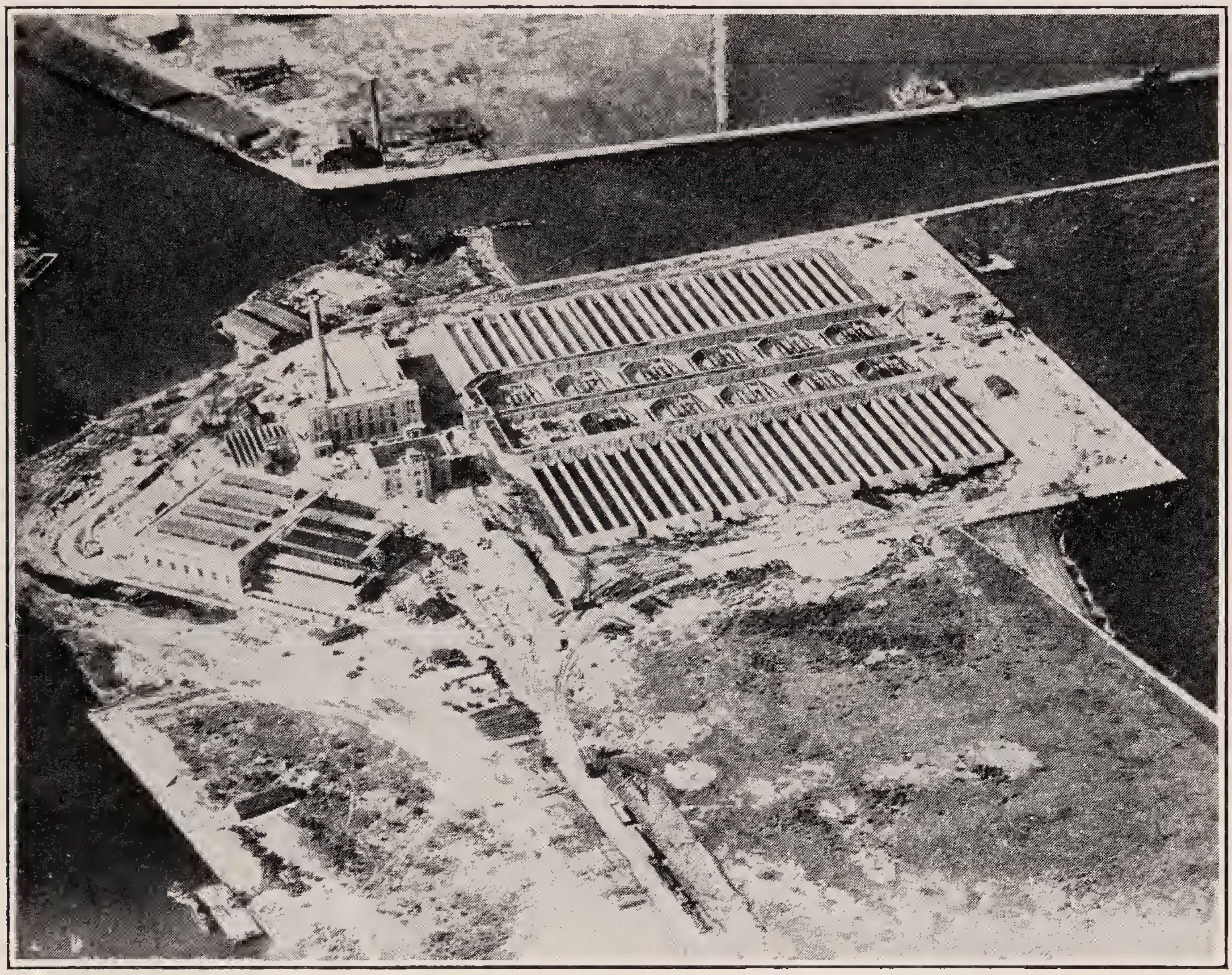

Fig. 6.—Sewage disposal plant.

The health of every city and town requires some safe method of waste disposal. When all towns and cities have provided for the sanitary disposal of wastes they will have gone far toward the ideal, and will have eliminated the cause of many communicable diseases.

INSECTS AND DISEASE

Many of the serious ills of mankind are transmitted by flies, mosquitoes, lice, ticks, and other forms of vermin. It has been said that of man's natural enemies, flies and mosquitoes are among the greatest. Non-biting flies transmit disease by transference. They frequent filthy places where the parasites of disease abound. Their bodies are covered with hair and well adapted to carry the germs of contagion. Having become infested with the parasites from filth the matter of transferring them to food and drink is simple. Blood-sucking flies and mosquitoes transmit disease by inoculation—actual injection of the disease parasite into the system. Some of the diseases which are transmitted by flies are typhoid fever, diarrhea and enteritis, cholera, dysentery, paratyphoid fever, and intestinal parasitic infections.

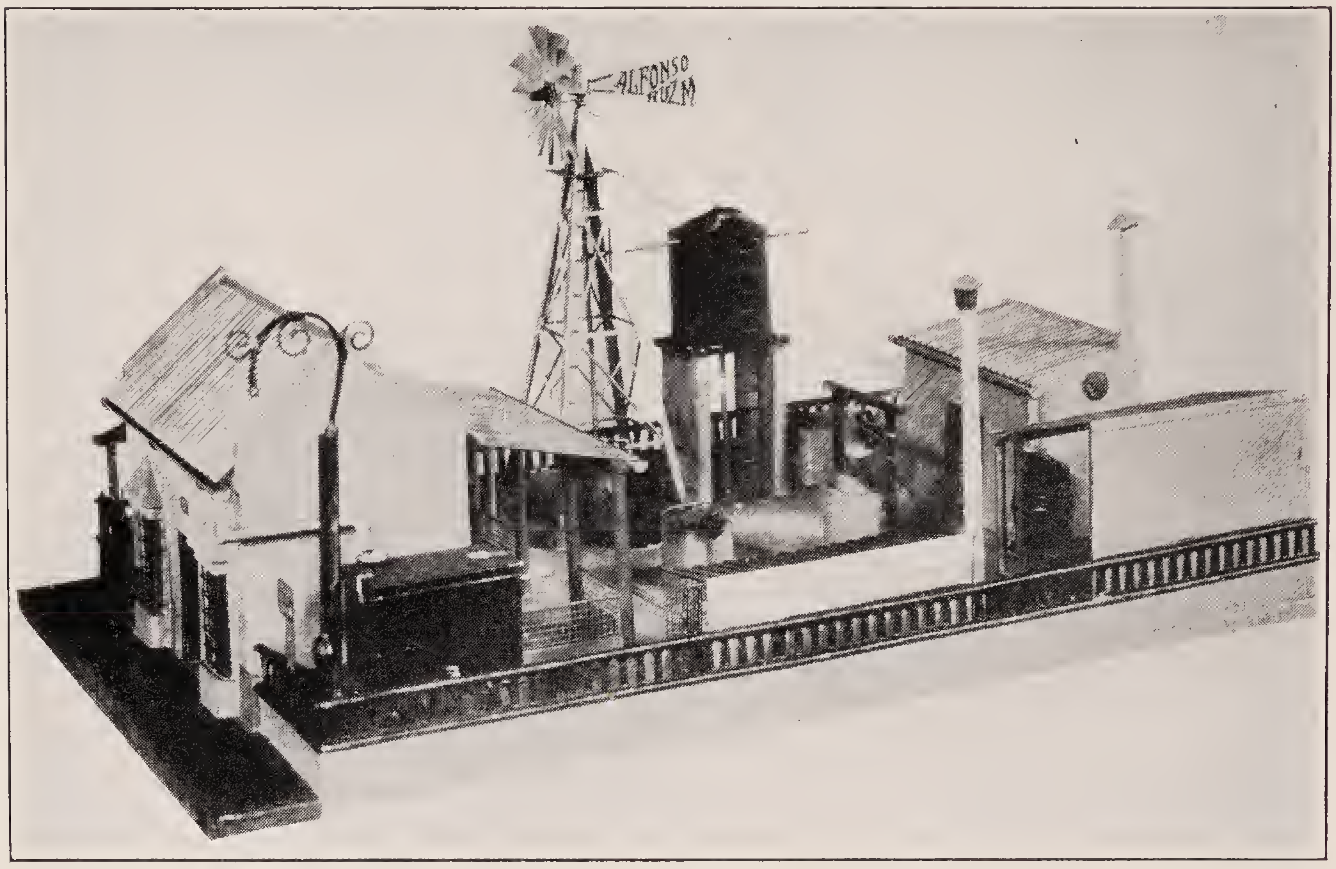

Fig. 7.—Dwelling screened against mosquitoes.

Much human suffering and many deaths are caused by malaria, yellow fever, dengue and elephantiasis, and mosquitoes play an important part in the propagation and transmission of these diseases.

Other insects which play a part in disease transmission are the tsetse fly which is a carrier of sleeping sickness; the flea, a carrier of bubonic plague; the louse, a carrier of typhus and trench fevers; and the tick, a carrier of Rocky Mountain spotted and relapsing fevers.

The most effective measure for the extermination of flies and mosquitoes is the destruction of their breeding places. The breeding places of flies include the excrement of man and most domestic animals, garbage, rotting vegetables, trash, etc. Mosquitoes breed in water, clear or foul, in small receptacles, pails, tubs, barrels, cesspools, etc.

RATS AND DISEASE

It has been said that in nature's scheme of affairs there is some useful purpose for every living thing. Perhaps in past centuries the rat was needed as a scavenger but at the present time this highly destructive and disease-carrying pest is a most dangerous and obnoxious nuisance without a single redeeming feature for its existence. Other animals and fowls serve us—horse, cow, pig, sheep, goat, dog, hen, goose, etc.—but we are servants of the rats. The rat in the first place makes us provide a shelter for him, and then makes us supply food for himself and his progeny.

There are three principal varieties of rats in the United States; namely, the brown or Norwegian rat, the black rat which is said to have come from Southern Asia, and the Alexandrian or roof rat from Egypt. The presence of the brown rat, which is larger and more powerful than the other two varieties, was noted in this country at the beginning of the Revolutionary War, and it is believed that its arrival was responsible for the disappearance of the smaller rats which are now rarely found in the United States, except at seaports.

Public Health Bulletin 103, issued by the United States Public Health Service, contains the following concerning rats as transmitters of disease:

> Rats have been the agents in transmitting bubonic plague into all parts of the world. According to authoritative records, this disease has, in recent centuries, destroyed millions of lives. Today plague exists in the rats of several English seaports, in Southern Europe, Africa, and in all parts of the Orient. It is also present on the east and west coasts of South America. Plague has not only cost an enormous loss of lives, but the measures for its control have cost many million dollars.
>
> Rats are frequently infected with intestinal parasites, especially tapeworm. Trichina (a genus of nematode endoparasitic animal organisms) is also found in rats, and these rodents are probably a considerable factor in transmitting the infection among hogs, from whence it may infect men.
>
> Of all disease-bearing parasites, the rat stands supreme in the cost its presence has entailed upon mankind in toll of lives and money.

Rats can be destroyed by trapping, by poisoning, and by using natural enemies, such as certain breeds of cats and dogs, but an additional important measure necessary to reduce the rodent population is the proofing of homes and other buildings so they cannot enter. This not only starves them by keeping them away from the food supply but also deprives them of their best breeding places.

The Bureau of Biological Survey, United States Department of Agriculture, which has done much to educate the public concerning the loss of health and property chargeable to rats, transferred a mechanical model on this subject to the Museum. Its purpose is to warn the public not to tolerate rats in homes, and to instruct the people of this country in the matter of rat-proofing of buildings.

NUTRITION

Many of our physical ailments could be avoided by giving attention to the proper selection of food. We may eat three supposedly good meals a day, and still be starving for the vital elements which our bodies require. It is very easy to overeat and yet to be undernourished. Medical authorities are giving more and more study to the prevention and cure of disease by the use of proper foods.

Good food is not necessarily expensive. The cheapest food is often most nutritious, and expensive food is frequently harmful. The important thing is the selection of food so that the diet will be composed of all the fundamental substances necessary for the formation and upkeep of the body. A suitable diet must contribute such a quantity of the body elements as will suffice to replace daily losses. In ordinary circumstances that food to which we have accustomed ourselves, under the guidance of natural impulse, corresponds best to the demands of the body.

The mistake that many people make is in neglecting to use enough milk, fruits, vegetables, and whole grain cereals from which the outer covering has not been removed—rice, wheat, oats, corn, barley—the natural foods in which vitamins and minerals are most plentiful. Without them the teeth, blood, and bones will suffer, and bodily functions will be interfered with. A deficiency of vitamin "A" in the diet may result in symptoms of rickets and a disease of the eyes as well as lack of normal development. A deficiency of vitamin " B " may result in the loss of appetite and symptoms of a disease of the nerves called beriberi. A deficiency of vitamin " C " may result in symptoms of scurvy. A deficiency of any of the vitamins in the diet will result in impaired growth and health.

The exhibit illustrating this subject directs attention to the importance of proper diet by showing one table with health-giving foods, and another table containing foods which, because of improper cooking or other reasons, are not nutritious. Dolls seated at the first table are robust and strong, while the dolls at the second table are pale and unhealthy.

MILK

Milk is not just a pleasant drink or food for children and sick adults, but it is an ideal food for everyone. It looks simple, but it is the most complex food in the world—liquid meat, sugar and fat with mineral salts and life-giving vitamins.

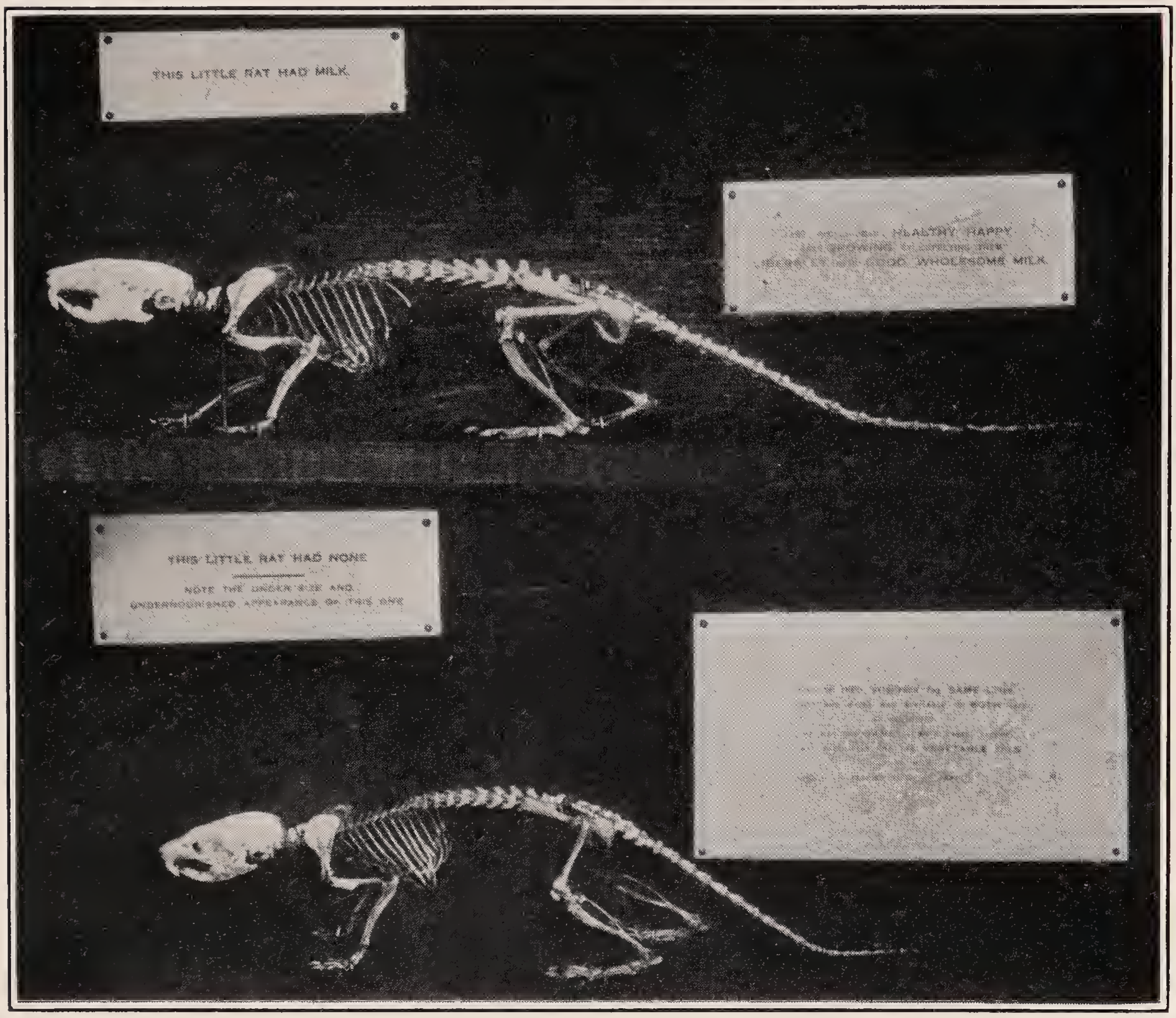
THIS LITTLE RAT HAD MILK.
THIS LITTLE RAT HAD NONE
NOTE THE UNDER SIZE AND UNDERNOURISHED APPEARANCE OF THIS ONE

Fig. 8.—Effect of milk on development.

Milk may be bad in several ways. It may be taken from diseased animals; it may be spoiled through the entrance of contaminating microorganisms from the air; it may be infected by the parasites of water-borne diseases, cholera, typhoid fever, paratyphoid fever or dysentery, and it may contain the microorganisms of diphtheria, scarlet fever or typhoid fever, if handled by carriers of these diseases.

Health workers are engaged in active campaigns for pure milk. Tuberculous cows are being bought and killed. This is reducing the danger of bovine tuberculosis. The dilution of milk with water, and the consequent danger of its infection with the parasites of water-borne diseases, is illegal and persons guilty of the practice are punished. Pasteurization, distribution in bottles, and preventing persons who have had communicable diseases from handling milk supplies until it has been proven that they are not disease "carriers," are additional precautionary methods of insuring the purity of milk.

There is pictured in figure 8 the result of a test made to show the important part milk plays in growth and development. The two rats used in the test were from the same litter. The diet for both rats was the same, except the little rat had vegetable oils but no milk. The large rat had milk. The length of the test was the same for both rats.

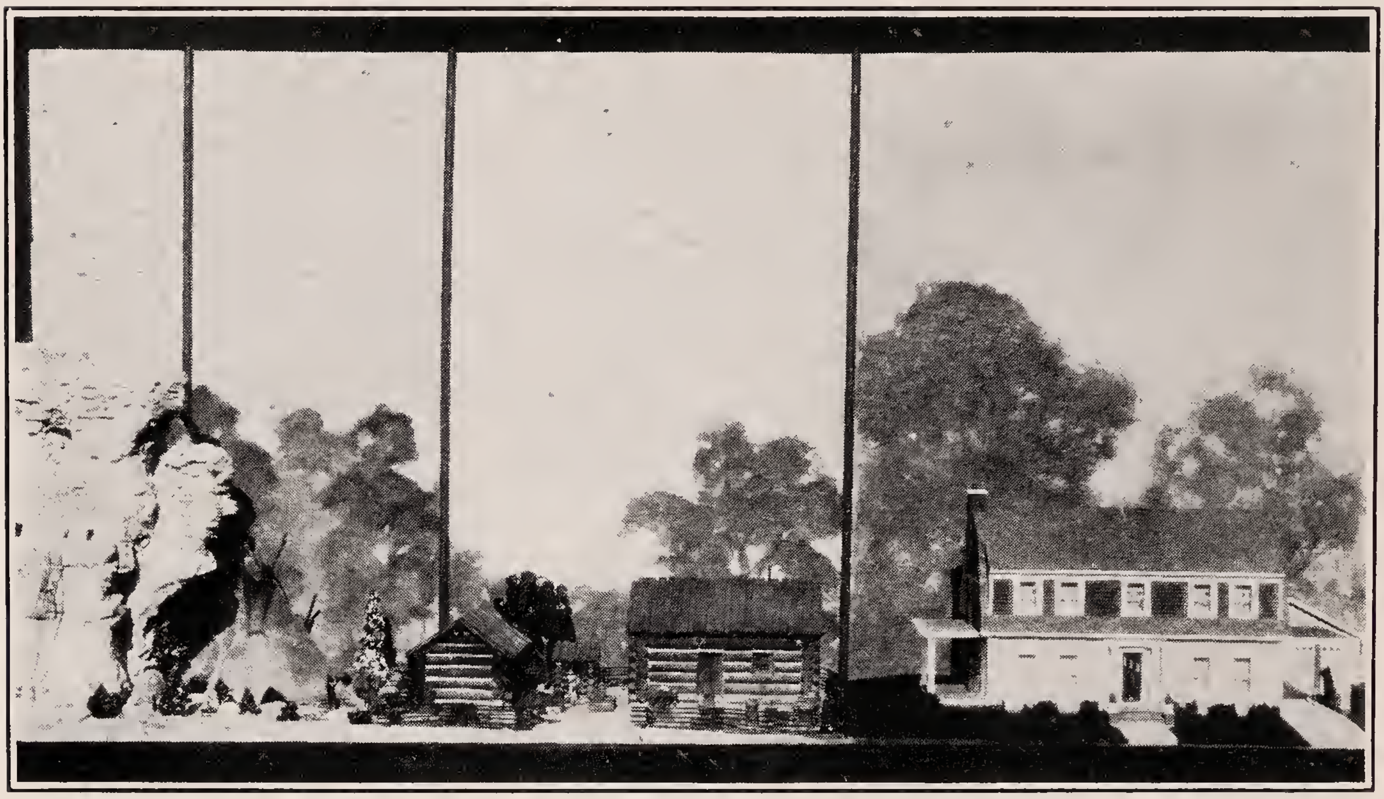

Fig. 9.—Evolution of the American home.

HEALTHFUL HOMES

Figure 9 shows a series of models which illustrate the evolution of the American home from the early cliff dwellers to the present time. The pioneers, the first civilized race to inhabit the country, built their homes from logs. They were more warmly and cleanly housed than the Indians, yet it is estimated that their average length of life was less than thirty years. The pioneers, of course, had no knowledge of the dangers from germs, the pollution of wells, and other important sanitary conditions. Their wells were often located so close to the outside toilet and barn that the seepage of both would drain into the water which was used for drinking and cooking purposes.

In approved homes of today every consideration is given to the most hygienic method of living. Modern heating, lighting, plumbing, vacuum sweeping, improved methods of cooking, sanitary refrigeration of food, screening, and rat-proofing are all playing an important part in increasing the average length of life which, in some localities of the country, has risen to the high average of 58.32 years.

CHILD HEALTH

Every baby cannot be born into a luxurious home, but it is every child's rightful heritage to be born into a healthful home. The home, the community, and the nation are richer for every healthy, happy baby born, because the baby is the foundation upon which the safety of race and civilization depend.

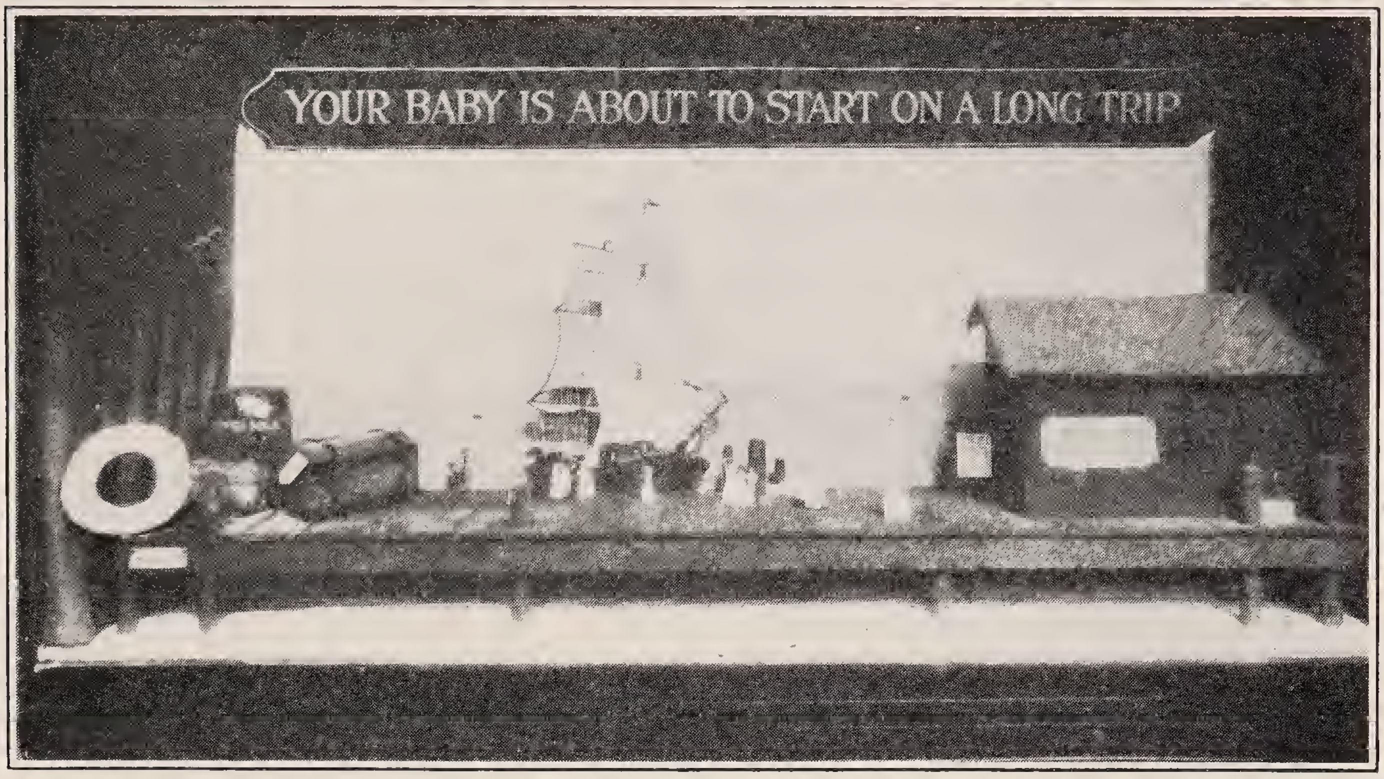

Fig. 10.—Child hygiene model.

Much is being done nowadays to see to it that babies are not denied the birthright of a sanitary and protective home. This is being accomplished by schools and colleges establishing classses in home-making and motherhood; by hospitals holding baby clinics, and by magazines and newspapers which publish articles on prenatal care and care of the baby after birth.

Figure 10 is a picture of an exhibit arranged to impress parents with the fact that a baby has a long journey before it. This is a working model symbolizing the ship "Child Health," of which the mother is captain, preparing to sail on the voyage of life. The passengers, newborn babies, who are embarking have applied for safe passage to

Grown-up Harbor via Baby Landing, South School Islands and Adolescent Point. It is a reminder to parents that their babies are beginning a long, hazardous journey beset with obstacles, and that it is their duty to see that the trip is started right with proper food, hygienic surroundings, and care, so that the ship may be brought safely to its destination with its valuable cargo.

The exhibit shown in figure 11 was designed to attract the attention and arouse the interest of children, who have just learned to read, in the fundamental rules of hygiene. The modern health crusade is an educational movement which is acquainting the children of this country with hygiene and disease prevention. The illustration on the cover is a part of the exhibit on this subject. This is the leader of the health crusaders who is exhorting his young recruits to follow his example in the everyday rules of hygiene. Good health in early adult life depends on sleep, bathing, exercise, fresh air, proper food, cleanliness, freedom from worry, avoidance of disease and healthful surroundings, and an exhibit directing attention to these essentials of well-being was added to the collection.

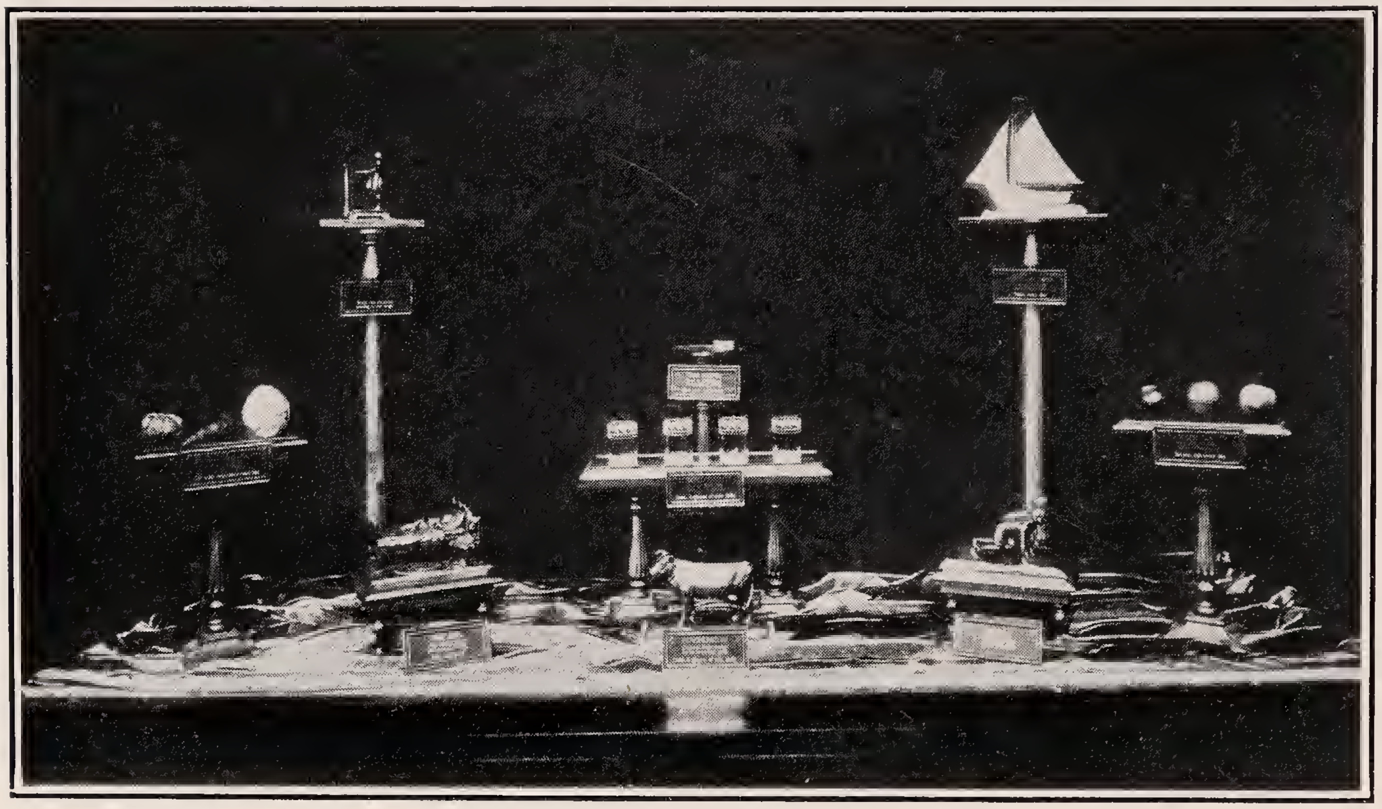

FIG. 11.—Child hygiene exhibit.

RECREATION

The care of the health requires a just balance between activity and recreation. Joy, pleasure, and laughter are mental stimulants. They increase the flow of blood and so aid in the work of building the body and repairing wasted tissues.

The health lesson to be gleaned from the exhibit arranged under this heading is that everyone needs recreation; that a real vacation means to vacate your old environment, your regular occupation, your everyday self, and have a complete change.

General rules for recreation cannot be laid down, because the working capacity and need of recreation are different for every individual. The labels of this exhibit explain that everyone should think of their own needs and arrange recreation periods and vacations which will do them the most good; also, that in planning a vacation one should try to get away from the things he or she has been doing all year and do the opposite. For instance the letter-carrier does not need a walk—he needs a hammock and a lazy time; the town man needs the quiet of the country—the country man needs the stimulus of the town; the mountaineer needs the ocean—the lowlander needs the hills while women who keep house should board, and those who never see a kitchen throughout the year should camp out and get their own meals.

ORAL HYGIENE

Here is an exhibit (see fig. 12) designed to show the importance of the care of the mouth and teeth. It has not been long since no thought was given to the teeth until they began to ache. Nowadays mouth hygiene is taught in the schools, and children learn that milk, eggs, whole wheat bread, fresh vegetables, green foods, etc., contain the lime needed to build strong, healthy teeth, and that some hard crusty food should be eaten every day to give the jaws vigorous exercise and promote proper chewing and flow of saliva.

Failure to keep the mouth and teeth clean often leads to serious trouble. Infected teeth, tooth-sockets or gums may cause such diseases as acute and chronic rheumatism, ulcers of the stomach, functional and organic heart disease, diabetes, infection of the cavities of the face and head, neuritis, neuralgia, etc. Much can be done to prevent such conditions if the teeth are cleaned after each meal, if possible, but especially at night before retiring. The soft deposits that precede tooth decay can be brushed off when first deposited. They cannot accumulate and promote decay if the teeth are properly and regularly cleaned.

Preventive dentistry—oral prophylaxis—promotes the health and happiness of the people. A toothbrush is a mighty weapon in protecting against disease, but it is a saving in the long run to have the teeth inspected regularly.

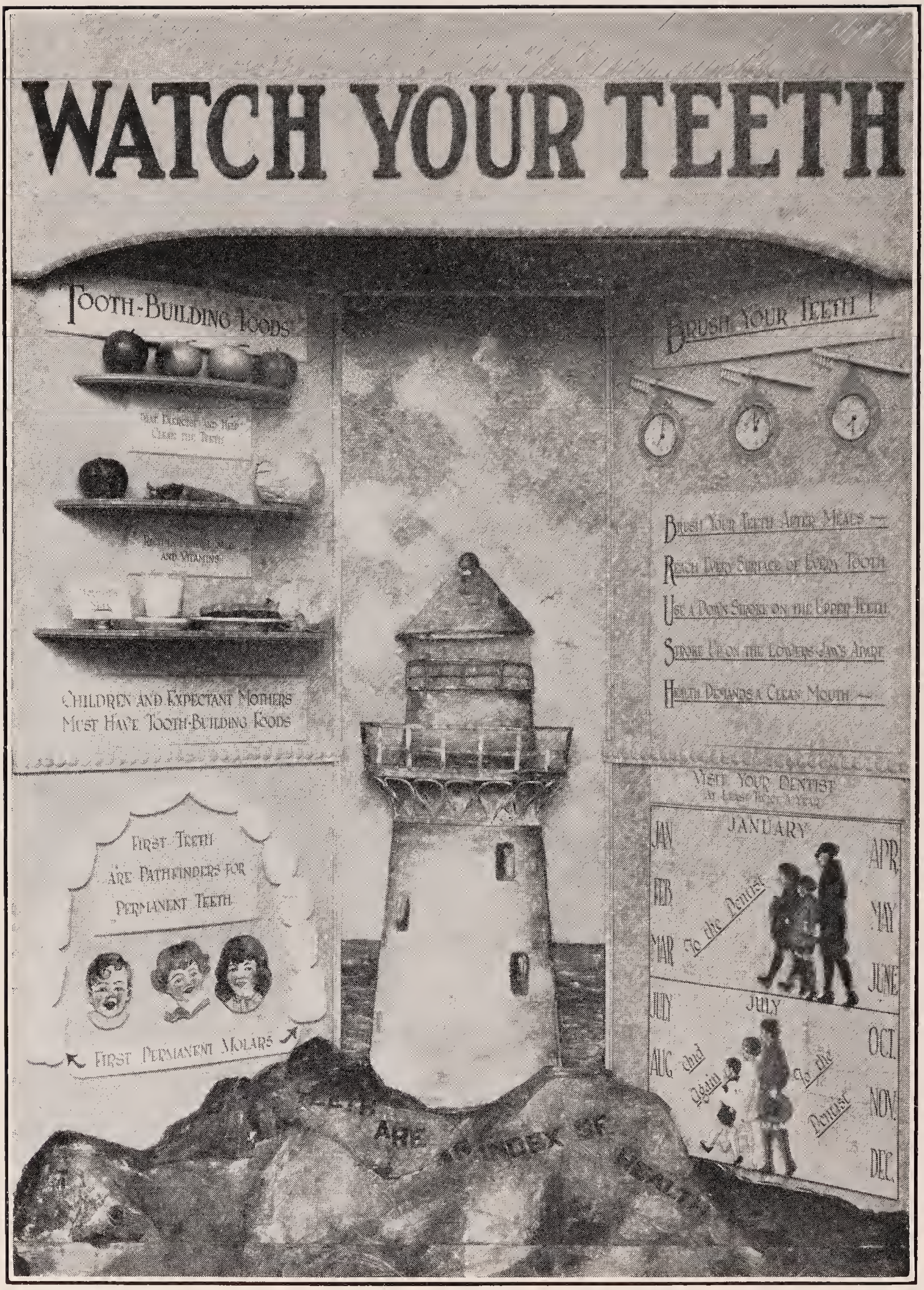
WATCH YOUR TEETH
TOOTH-BUILDING FOODS
AND VITAMINS
CHILDREN AND EXPECTANT MOTHERS MUST HAVE TOOTH-BUILDING FOODS
FIRST TEETH ARE PATHFINDERS FOR PERMANENT TEETH
FIRST PERMANENT MOLARS
BRUSH YOUR TEETH !
BRUSH YOUR TEETH AFTER MEALS —
REACH EVERY SURFACE OF EVERY TOOTH
USE A DOWN STROKE ON THE UPPER TEETH
STROKE UP ON THE LOWERS-JAWS APART
HEALTH DEMANDS A CLEAN MOUTH —
VISIT YOUR DENTIST
JANUARY
JAN
FEB.
MAR
To the Dentist
APR.
MAY
JUNE
JULY
JULY
AUG
and Again to the Dentist
OCT.
NOV.
DEC.
ARE AN INDEX OF HEALTH

FIG. 12.—Oral hygiene exhibit.

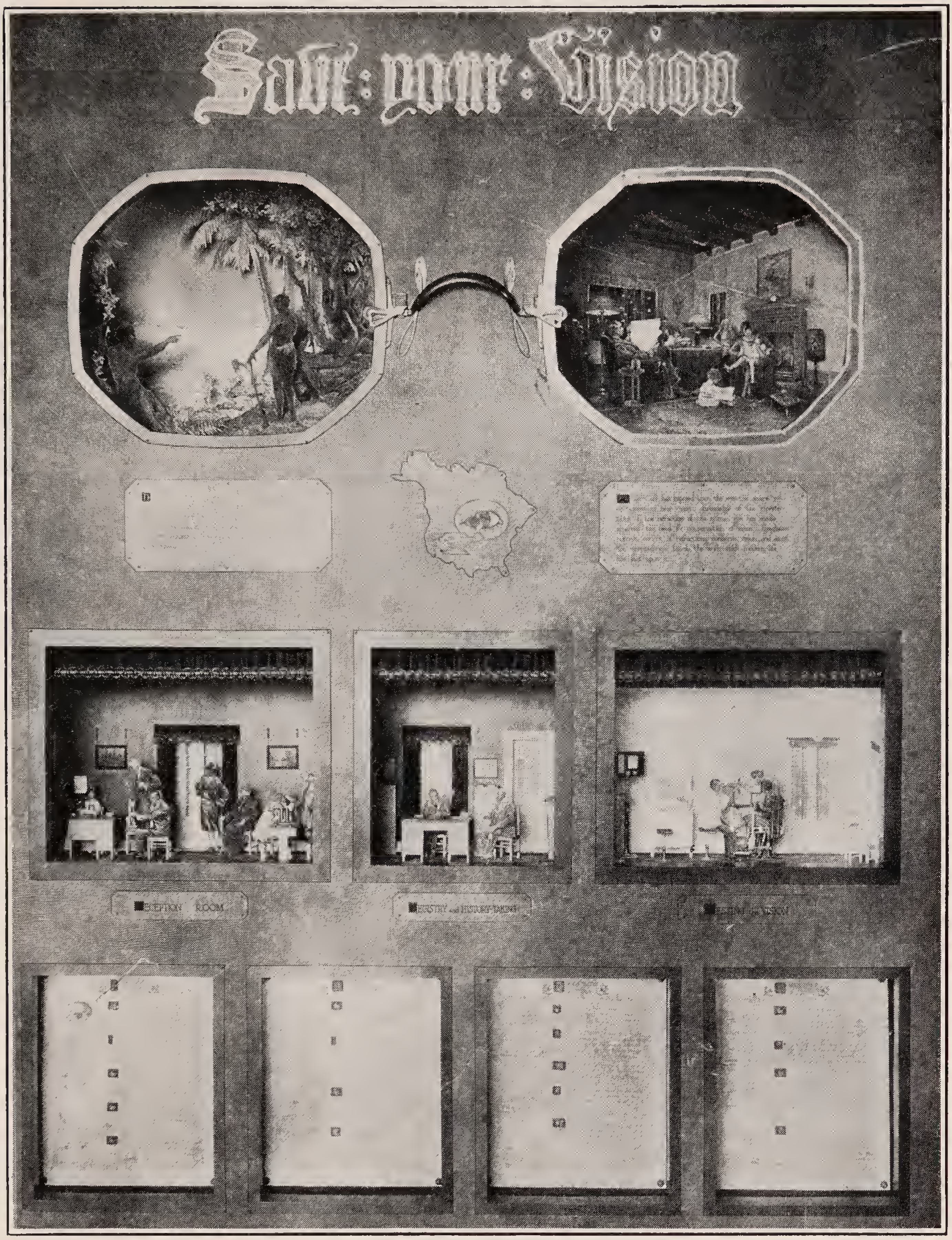

FIG. 13.—Conservation of vision exhibit.

CONSERVATION OF VISION

Almost everyone realizes what a delicate and marvelous organ the eye is, and appreciates the necessity of protecting it from injury by foreign substances. Next to life itself is vision, yet it is estimated that nine out of ten persons under twenty-one years of age have defective eyes, and that it is impossible to find a man or woman beyond the age of forty without defective vision.

The eyes of our primitive ancestors were no better than our own, but they used them under more favorable circumstances. They used them chiefly for distant vision, and consequently such great demands were not made upon them. Modern life has imposed on the eye the severe requirement of near vision with an accompanying increase of eye troubles; hence the need of eyesight conservation, and the use of adjuncts to improve vision and overcome the strain imposed by present day conditions.

The exhibit pictured in figure 13 was arranged to draw attention to the need of preserving the sight, and the part eyeglasses play in correcting errors of refraction and relieving eye strain. It points out the common defects to which the eye is heir; hyperopia or farsightedness; myopia or nearsightedness; presbyopia or loss of accommodation due to age; astigmatism, a lack of symmetry in the cornea; and strabismus or cross-eyes. Illuminated charts convey additional information concerning the lenses used in overcoming these defects.

INDUSTRIAL HYGIENE

Health is precious. The loss of health causes harm and injury not only to the individual himself, but also to the community. The sick individual suffers pain, cannot work, is unable to earn money, and does not enjoy life. The community loses through the diminution of the working power of the individual citizen, and incurs expenditure for the support of the improvident sick. In addition, persons suffering with communicable diseases are a menace to the entire community.

Industrial hygiene is that branch of hygiene which is aimed at prevention of disease and maintenance of health among industrial workers. Scientific inquiry has discovered the injurious results of various trades and occupations upon the persons engaged in them. This knowledge, acquired by careful and systematic study, has made it possible to counteract unhealthy influences affecting the welfare of workers, and has reduced the hazards of employment and the economic loss due to incapacitated workers. When it is considered that reliable experts estimate that nearly two billion dollars are wasted annually on account of preventable illness and postponable death among the gainfully employed, the tremendous importance of industrial hygiene and sanitation is, or should be, apparent.

Perhaps a complete removal of dangers in factories and workshops is impossible, but the risks from injuries and disease transmission can be confined to the smallest possible limits by the adoption of such health saving devices and measures as those shown in the model of a factory pictured in figure 14, as follows: Safe clothing, angle-jet drinking fountain, dust removal, rest room, cloak and toilet rooms, fresh air, daylight, a clean workroom, lunchroom, adjusted chairs, guarded machinery, fire protection, safe exits, good lights, dispensary, etc.

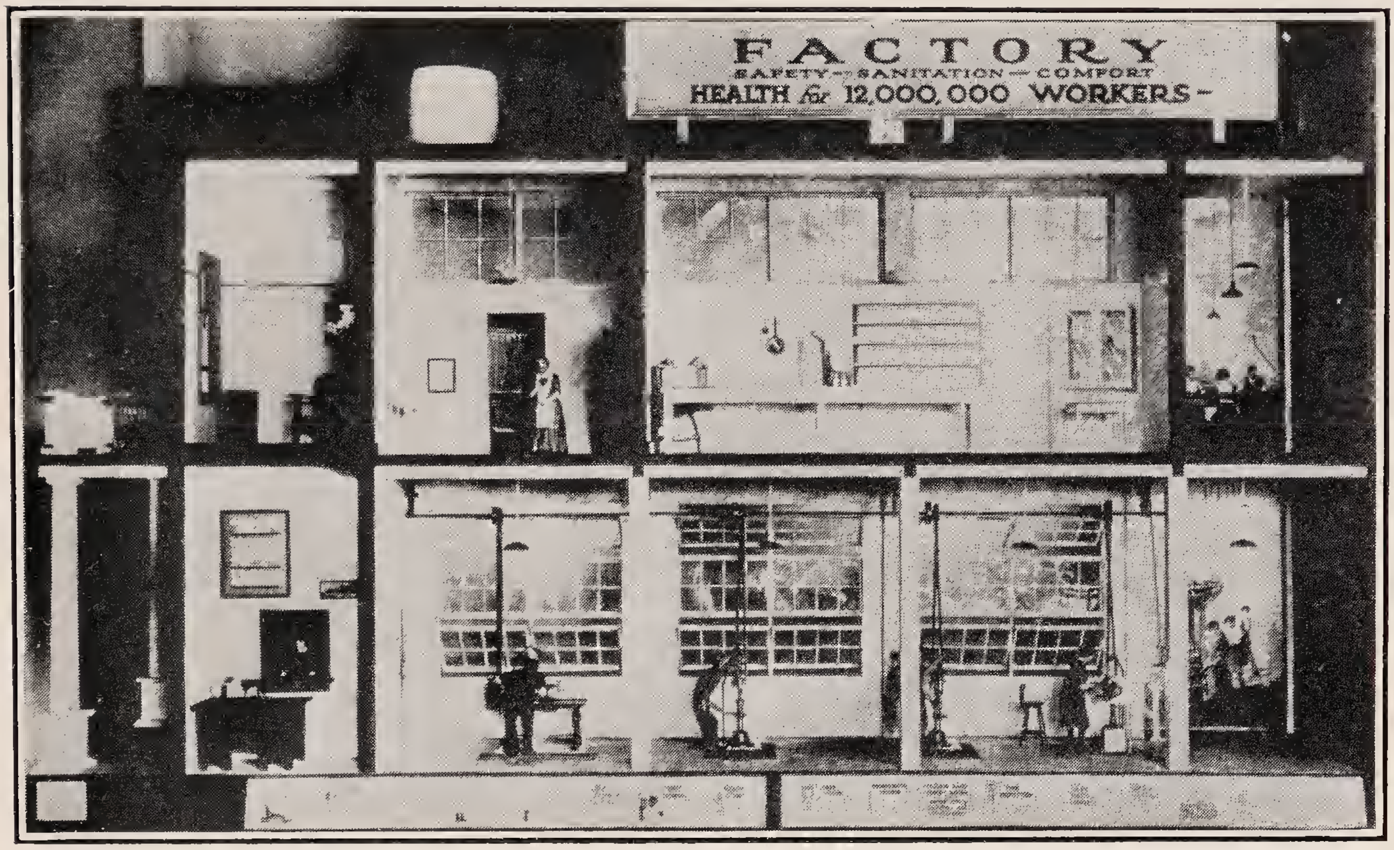
FACTORY
SAFETY — SANITATION — COMFORT
HEALTH for 12,000,000 WORKERS —

Fig. 14.—Industrial hygiene model.

SOCIAL HYGIENE

Social hygiene has as its general purpose the perpetuation of the family as a social unit in such a manner that it will contribute in the largest way to the happiness and usefulness of its individual members, and to the best development of the race.

One of the principal activities of the social hygienist is educational, and this involves the teaching of youth helpfully in the matter of sex. Sex health determines the quality of life which is passed on to the next generation. As a link in the chain of the race, the boy and the girl are of sufficient importance to justify the use of any terms which are necessary to give them the information about themselves that they need in order to understand themselves and to solve their sex problems wisely.

It is the duty of parents, teachers, and physicians to give children this information early enough in life to make sure that they get it from intelligent, clean, and serious people rather than from ignorant, lewd and frivolous ones, as they often do. Museums can assist in the work of disseminating knowledge on this important subject, and with such an object in view this Museum has added to its health collection an exhibit (see fig. 15) and a series of charts which give an understanding of the functions of the sex organs, and what will be the result if they become diseased. In addition, the story of the reproduction of plants, animals, and human beings is pictured and described in an interesting and inoffensive manner.

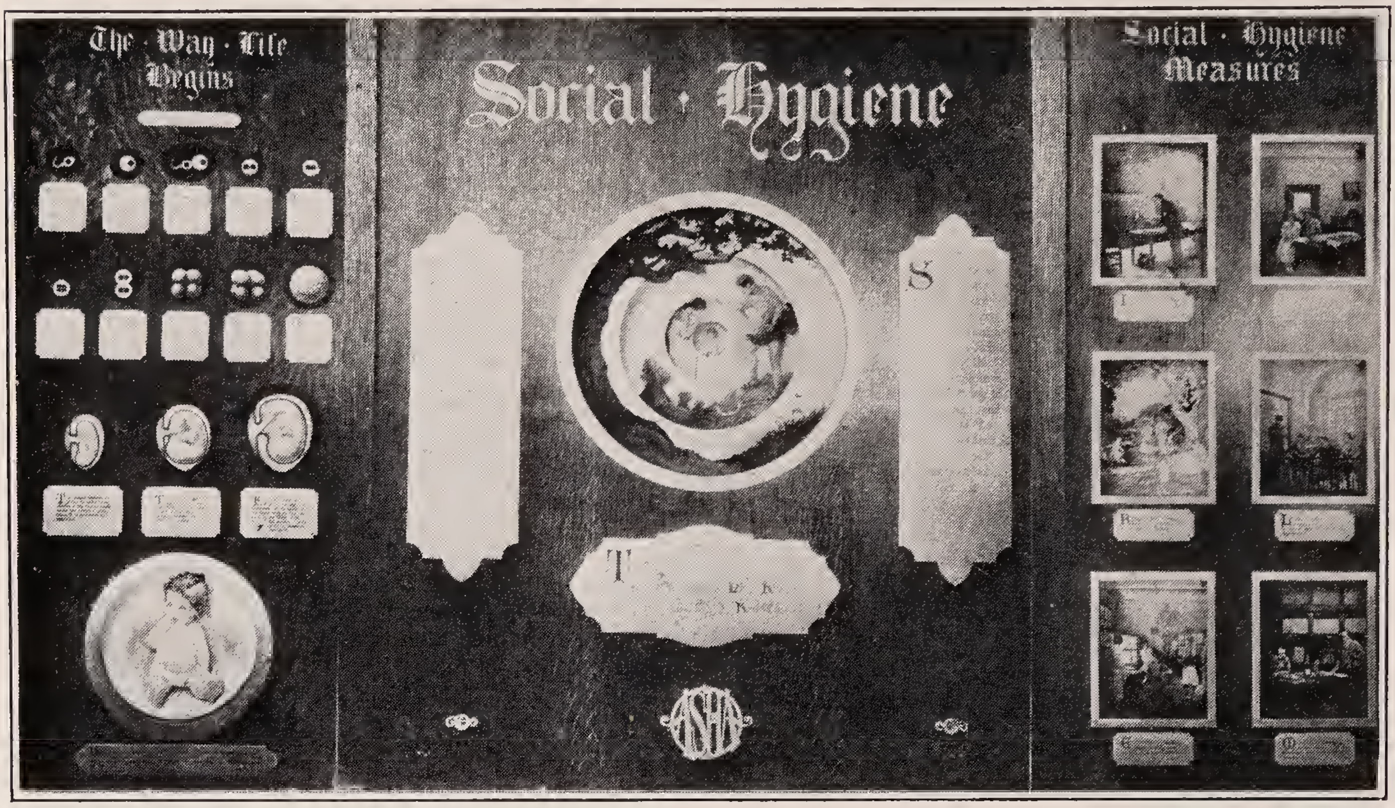

Fig. 15.—Social hygiene exhibit.

FIRST-AID AND LIFE-SAVING

Accidents occupy a prominent place among the external influences injurious to health. Very often life or death depends upon how soon assistance is rendered to the injured. A person trained in first-aid can render more skillful assistance, and efforts are being made by schools, colleges, health authorities and organizations to make it as easy as possible for the people of this country to acquire knowledge concerning this subject.

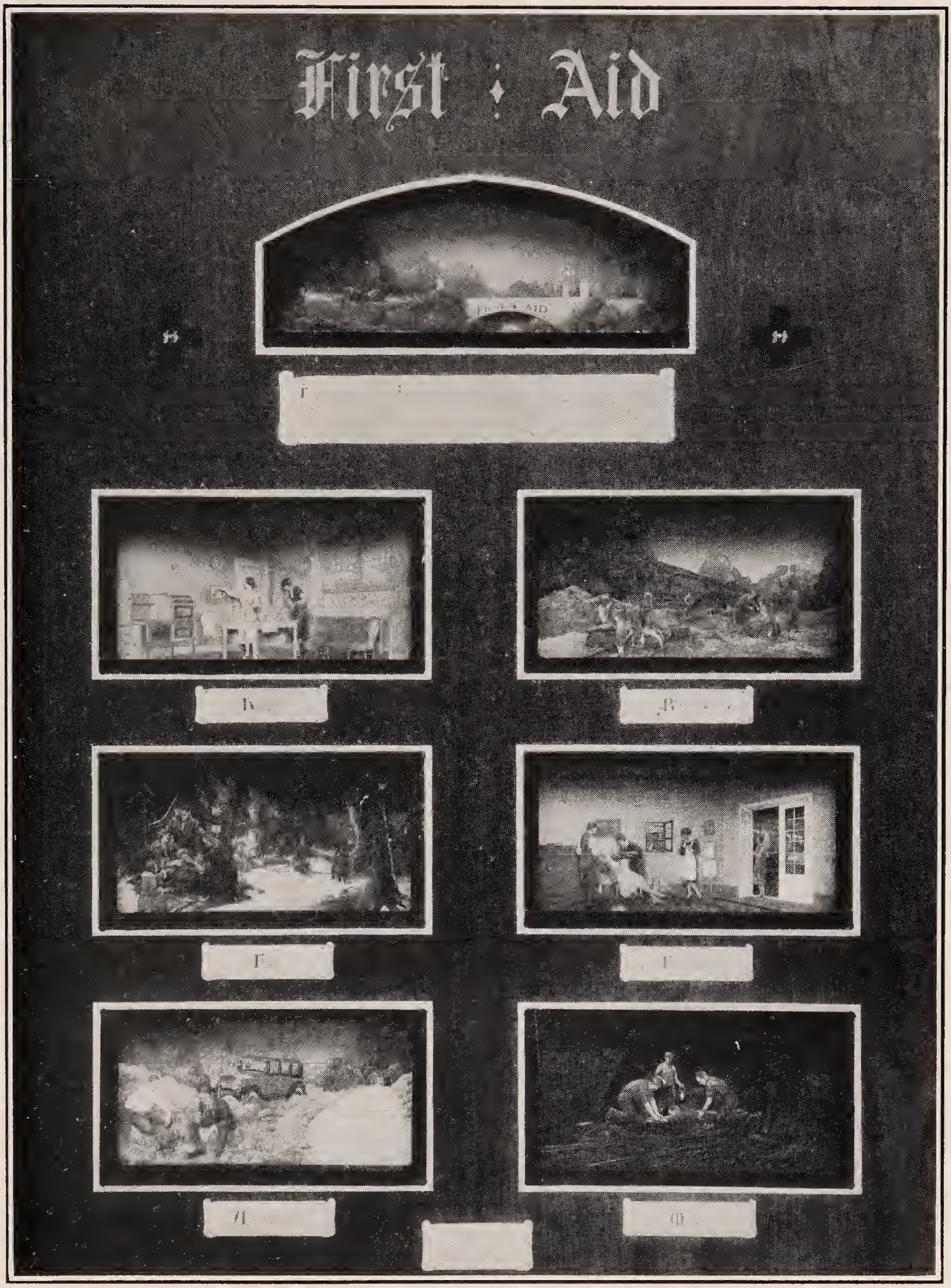

FIG. 16.—First-aid exhibit.

The first exhibit under this heading (see fig. 16) pictures first-aid as the bridge between the accident and medical or surgical assistance. Over this bridge the injured person is to be carried from the place of injury to the place of treatment. Once the bridge is crossed, and the injured person is placed in the hands of the medical attendant, first-aid is at an end. The remainder of the exhibit consists of scenes demonstrating the practical application of first-aid.

The greatest danger from wounds comes from their contamination with foreign substances, not always visible, but far-reaching in their effect. Certain invisible irritating matters (called germs) quickly find lodgment in the wound by transference from the air, the clothing, the skin—in fact from anything that may come in contact with it. In consequence of such contamination, blood-poisoning, gangrene, inflammation, fever, erysipelas, lockjaw or tetanus and a train of other complications are apt to follow any wound. Even scratches, when not properly cared for, may result in inflammation and the formation of gatherings or abscesses, which may disable a person for a considerable time, and cause the loss of a limb, or even of life. The second exhibit on first-aid (see fig. 17) shows how bandages may be applied to the different parts of the body, and warns that dressings applied to wounds shall not only look clean, but actually be aseptic, and free from infection and dirt.

The American National Red Cross deposited in the collection a series of small theater exhibits relating to home and school hygiene, first-aid, and life-saving.

PUBLIC HEALTH NURSING

There will always be sick and injured people who desire to have health restored or pain alleviated. It is the business of the doctor to diagnose the malady and outline the proper method of healing and nursing, and to see that the rules which he lays down are observed.

Until quite recently the work of a nurse consisted almost entirely of caring for the sick in a home or hospital. The beginning of the 20th century saw a rapid development of a new profession—public health nursing—with many members of the profession working individually and struggling with the multitudinous problems of nursing in relation to community health. The public health nurse has gradually become known to the people, as offering skilled nursing service in the homes, in the schools, in the factories—a service that not only aims at disease prevention but emphasizes the importance of health teaching through the adequate care of the sick.

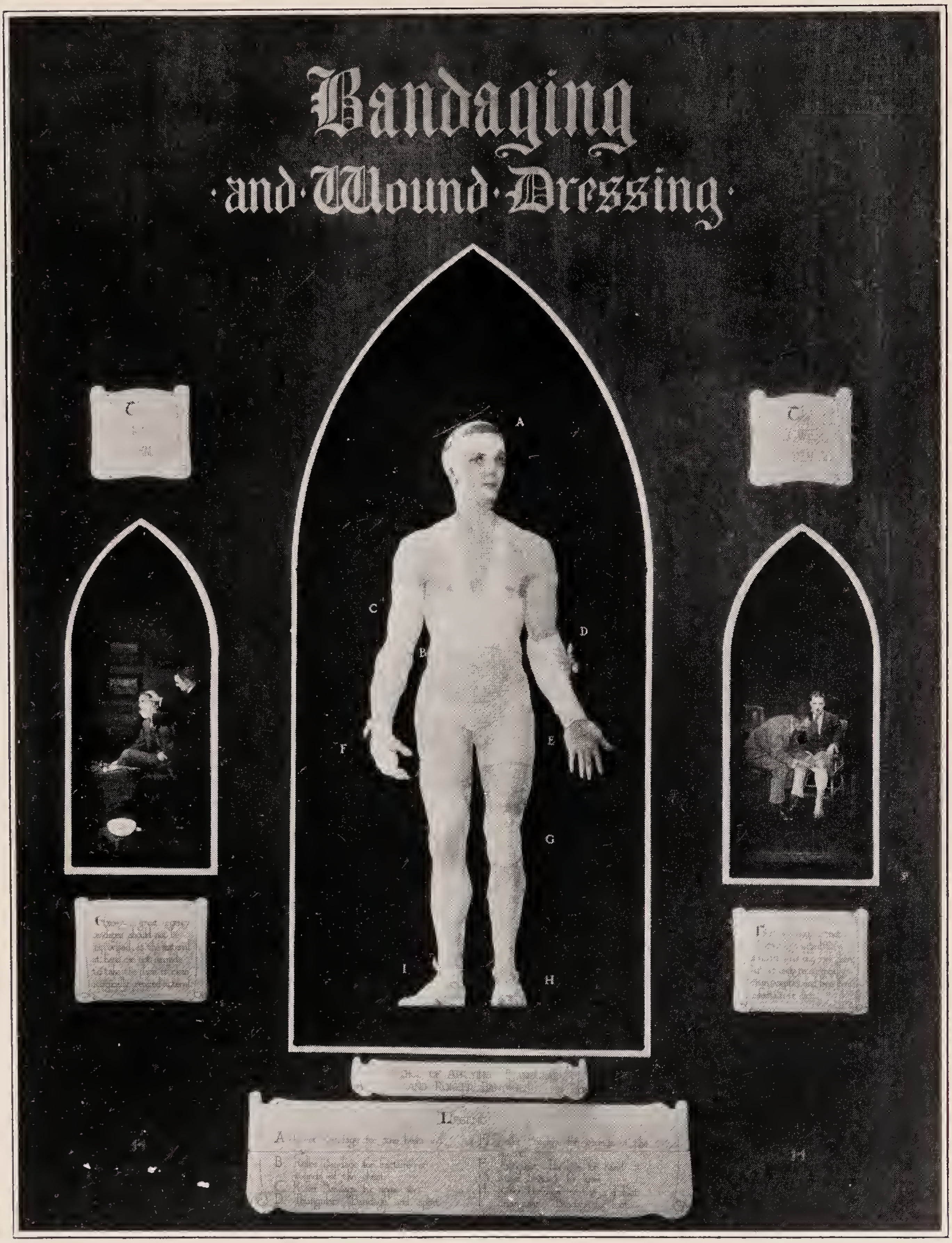

FIG. 17.—Bandaging and wound dressing exhibit.

The models shown in figure 18 show various phases of public health nursing.

TUBERCULOSIS

A number of externally very dissimilar diseases, almost all of which are chronic, are included under the name of tuberculosis. The proof that these apparently dissimilar maladies have a common origin and therefore are essentially of the same nature was brought about in 1882 by Koch's discovery of the *Bacillus tuberculosis.* This microorganism, which is found in all diseases connected with tuberculosis, causes within the body the formation of small tubercles and the production of inflammatory processes. Decay, destruction, and ulceration ensue, because the tubercles and the inflamed tissue gradually change into a dry, white, crumbling mass, resembling cheese, with concomitant suppuration. The ulcers form the entrance for other disease germs, by whose agency the characteristic symptoms of the disease may be changed in various ways. A frequent co-symptom of tuberculosis is the so-called hectic fever, which causes considerable rise in the temperature of the body at definite periods of the day, especially in the evening, and, together with profuse perspiration at night, awakens the patient. Sometimes this fever betrays itself in the patient at an early stage of the disease by sharp-edged red spots on the cheeks, which become especially visible during slight exertion, sense impressions, and emotions.

Fig. 18.—Public health nursing models.

The most frequent form of tuberculosis is pulmonary tuberculosis. Its outward characteristics are, besides the general symptoms of the disease, especially coughing, expectoration and want of breath. Frequently bleeding occurs as a result of the destruction of the sides of the lung vesicles and shows itself in a bloody colored expectoration; sometimes it increases to a dangerous extent, and may lead to throwing up considerable quantities of blood.

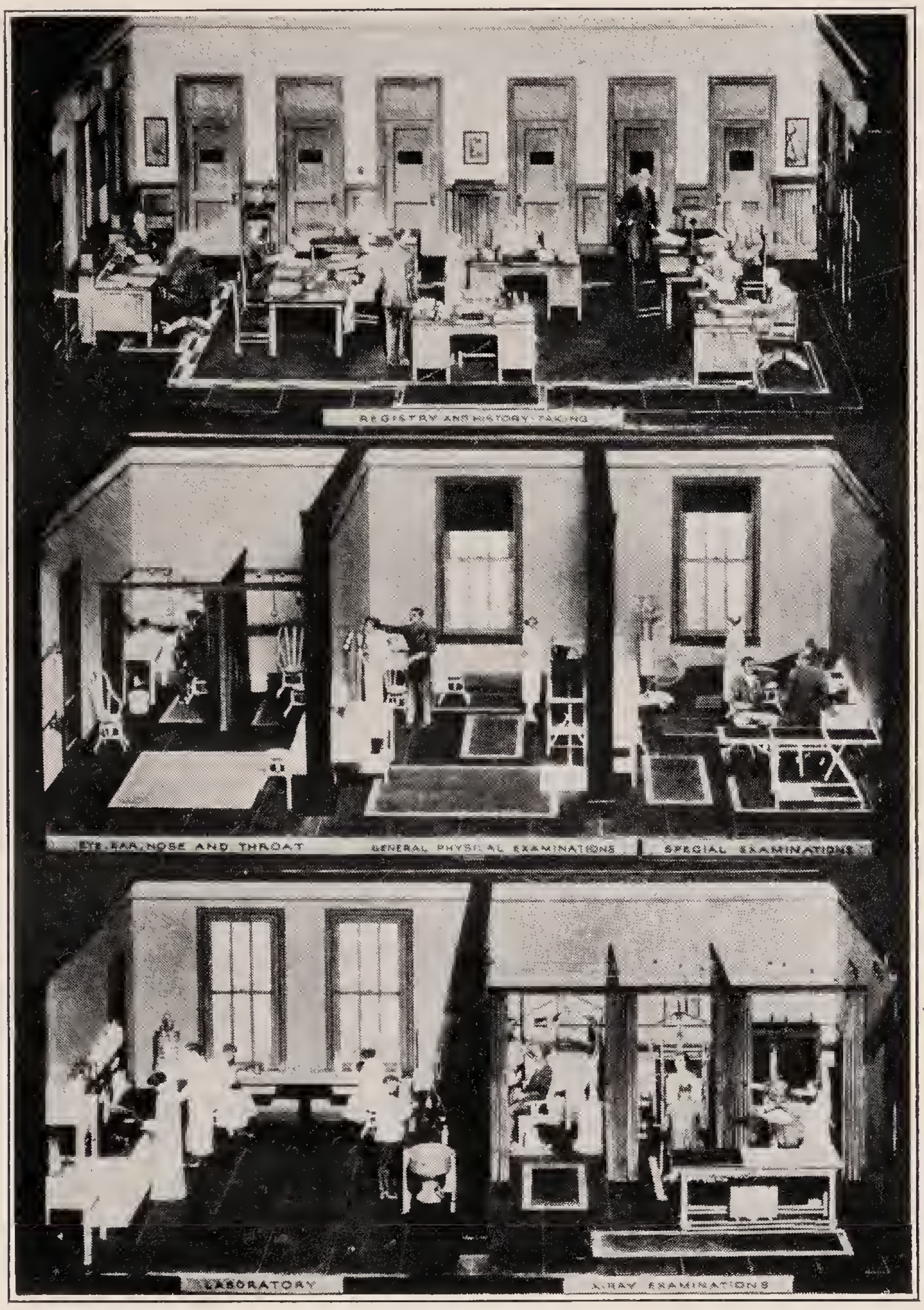
REGISTRY AND HISTORY TAKING
EYE, EAR, NOSE AND THROAT
GENERAL PHYSICAL EXAMINATIONS
SPECIAL EXAMINATIONS
LABORATORY
X-RAY EXAMINATIONS

FIG. 19.—Physical examination laboratories.

A group of models deposited by a national organization of physicians, laymen, and state and local associations, formed for the development of community resources for the control of this dangerous disease, illustrate conditions which weaken the body and make it susceptible to tuberculosis; the necessity of constant vigilance to detect the disease; care which should be exercised to prevent the spread of infection; and where cures are effected.

PERIODICAL PHYSICAL EXAMINATIONS

It used to be the province of the doctor " to take care of the sick and leave the well alone." That time has passed, however, and this is a day of preventive medicine when the doctor can do as much toward keeping the well from becoming sick as he does in the way of curing the diseased and healing the maimed. The late Surgeon-General William C. Gorgas demonstrated to the world the value of hygiene, sanitation and preventive medicine when he made the once disease-ridden Panama—where man could only live a short time because of yellow fever, malaria, and other diseases—a healthful place. But doctors, and others coöperating with them in health work, must have the assistance of communities and individuals if they are to increase the life span and prevent the unnecessary waste of life which still prevails.

If people will be examined every year by a trained physician, and then follow his advice and live hygienically they will add many years to the life span. Figure 19 shows modern offices equipped for making a complete physical examination to detect disease and infirmities in their incipiency when there is a better chance to cure or overcome them.

HEALTH VERSUS DISEASE

One of the most imposing exhibits of the collection is the model showing that public health workers build a wall of protection around a community which is comparable to a stone wall which might be constructed to keep out wild beasts. The wall built by these health workers is, of course, symbolical, but in reality their work and teachings serve as a wall of defense in aiding the community to keep away diseases which may be spread by lack of sanitation.

The exhibit is arranged to leave the parting thought with each visitor that the work of health authorities is disease prevention, which is everybody's work, and that it is chiefly due to their labors that many great epidemics are now prevented. When the work of these men and women, who toil day and night, is successful nothing amiss happens and the average citizen is unconscious of the fact that his health and life have been endangered, but when their labors are attended by failure, illness and death settle upon the community.

The purpose of the model is to impress upon each visitor that the struggle of health against disease is an unceasing one; that many of the most dangerous and harmful enemies of mankind are too small to be seen with the naked eye; and that it is the duty of every good citizen to take an active interest in all matters relating to hygiene and sanitation.

CONCLUSION

The hygiene and sanitation collection was inaugurated in response to requests to the Smithsonian Institution from public health workers throughout the country, who were of the opinion that the museum maintained by the government should take a part in the development of an educated and trained public opinion concerning matters pertaining to health, thus stimulating interest in the establishment of health exhibits by other museums of the United States.

As only a few years have passed since work was begun on this collection, many gaps must be filled before the task is completed. In the meantime, use is being made of posters and related exhibits which deal with health problems not yet illustrated by permanent material.

The lessons to be gleaned from the health exhibits are: *1,* that hygiene and sanitation have played, and are playing, an important part in increasing the life span and making the world a better place in which to live; *2,* that personal health may be obtained with knowledge, and that public health can be purchased with money; *3,* that every individual owes it to himself and his country to practice the common-sense rules of hygiene, and abide by the laws and regulations pertaining to health.

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THE MAGIC, PSYCHIC, ANCIENT EGYPTIAN, GREEK, AND ROMAN MEDICAL COLLECTIONS OF THE DIVISION OF MEDICINE IN THE UNITED STATES NATIONAL MUSEUM

BY

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FOR THE INCREASE AND DIFFUSION OF KNOWLEDGE AMONG MEN · PER ORBEM · SMITHSONIAN INSTITUTION · WASHINGTON 1846

Washington
Government Printing Office
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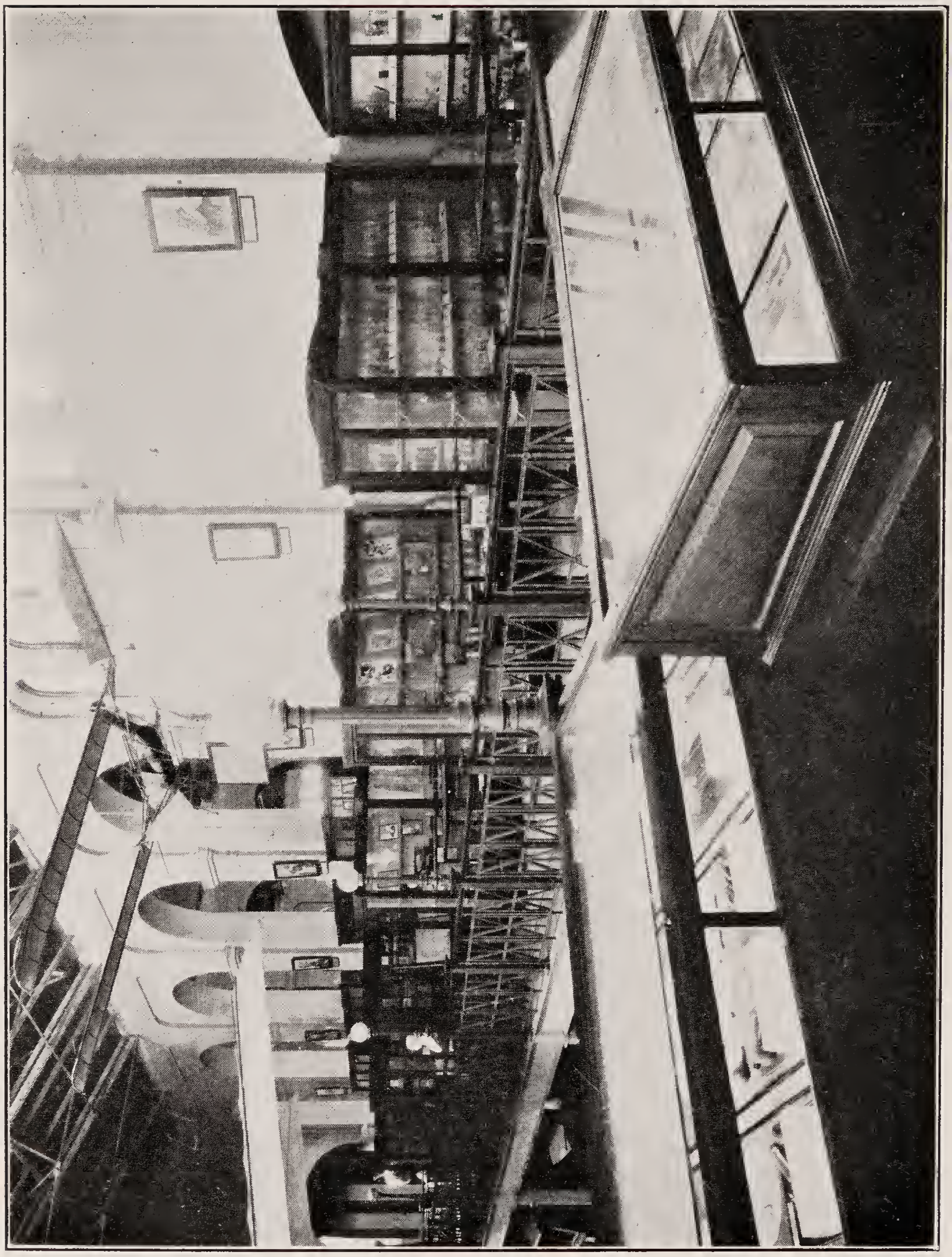

HISTORY OF MEDICINE EXHIBITS. EAST GALLERY

FOR DESCRIPTION OF PLATE SEE PAGE 2

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PARIS

THE MAGIC, PSYCHIC, ANCIENT EGYPTIAN, GREEK, AND ROMAN MEDICAL COLLECTIONS OF THE DIVISION OF MEDICINE IN THE UNITED STATES NATIONAL MUSEUM

By Charles Whitebread
Assistant Curator, Division of Medicine, United States National Museum

INTRODUCTION.

The origin of the materia medica collection of the United States National Museum dates back to 1881. In 1882 the drug collection which had been exhibited at the Centennial Exposition at Philadelphia in 1876 was transferred to the Museum by the Department of Agriculture. For a time the efforts of the section of materia medica were confined almost exclusively to procuring authentic specimens of medicinal materials. Some years later the scope of the section was enlarged to include exhibits visualizing the history of the healing art, and in 1898 the more comprehensive name of division of medicine was substituted for the "section of materia medica" theretofore used. The scope of activities of the division was again enlarged in 1916, this time to include the history of pharmacy, public hygiene and sanitation, and the division, which up to that time had been administered under the department of anthropology, was made a unit of the department of arts and industries.

The materia medica collection has served the purpose of giving the general public an easy reference to specimens of "official" medicine and has afforded students of medicine and pharmacy the opportunity of studying this subject in its various details. The subjects of history of pharmacy, public hygiene and sanitation, because of their comparatively recent addition to the activities of the division, have not progressed to the same degree of perfection as the materia medica and history of medicine collections, but with the cooperation of the various government departments and outside agencies interested in these subjects, extensive plans for their development are now under way.

This paper has been prepared to meet the demand for labels and information concerning the historical medical collections, and to

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make the exhibits of value not only to those who find it convenient to pass through the exhibition halls, but to many others. In endeavoring thus to carry into effect the purpose of the Smithsonian Institution, "the increase and diffusion of knowledge among men," it has been considered preferable to describe small groups of related exhibits in detail rather than to compile a larger and more complete list which would necessarily be limited to very meager information.

The collections herein described are located on the east gallery, Arts and Industries Building. Plate 1 gives a view of one side of the gallery. Plates 2, 3, 4, and 5 show the arrangement of the separate exhibits.

EARLY THEORIES OF DISEASE.

Disease, a malevolent spirit, assuming material form either animate or inanimate, attacking the victim with or without provocation. Primitive.

Disease, a spirit, acting at the suggestion of a human enemy possessing supernatural powers. (Sorcery, witchcraft, conjury.) Savage and half-civilized people.

Disease caused by the angered spirits of the dead, either men or animals, or even plants. Savage and half-civilized people.

Disease, a punishment, inflicted by an offended deity. Ancient.

Disease due to the influence of the planets or other heavenly bodies. Astrology.

Disease due to a disturbance in the relative proportions or distribution of the fluids, or "humors" of the body, namely, blood, phlegm, black bile, and yellow bile. (Hippocrates, Galen.)

ARRANGEMENT OF EXHIBITS.

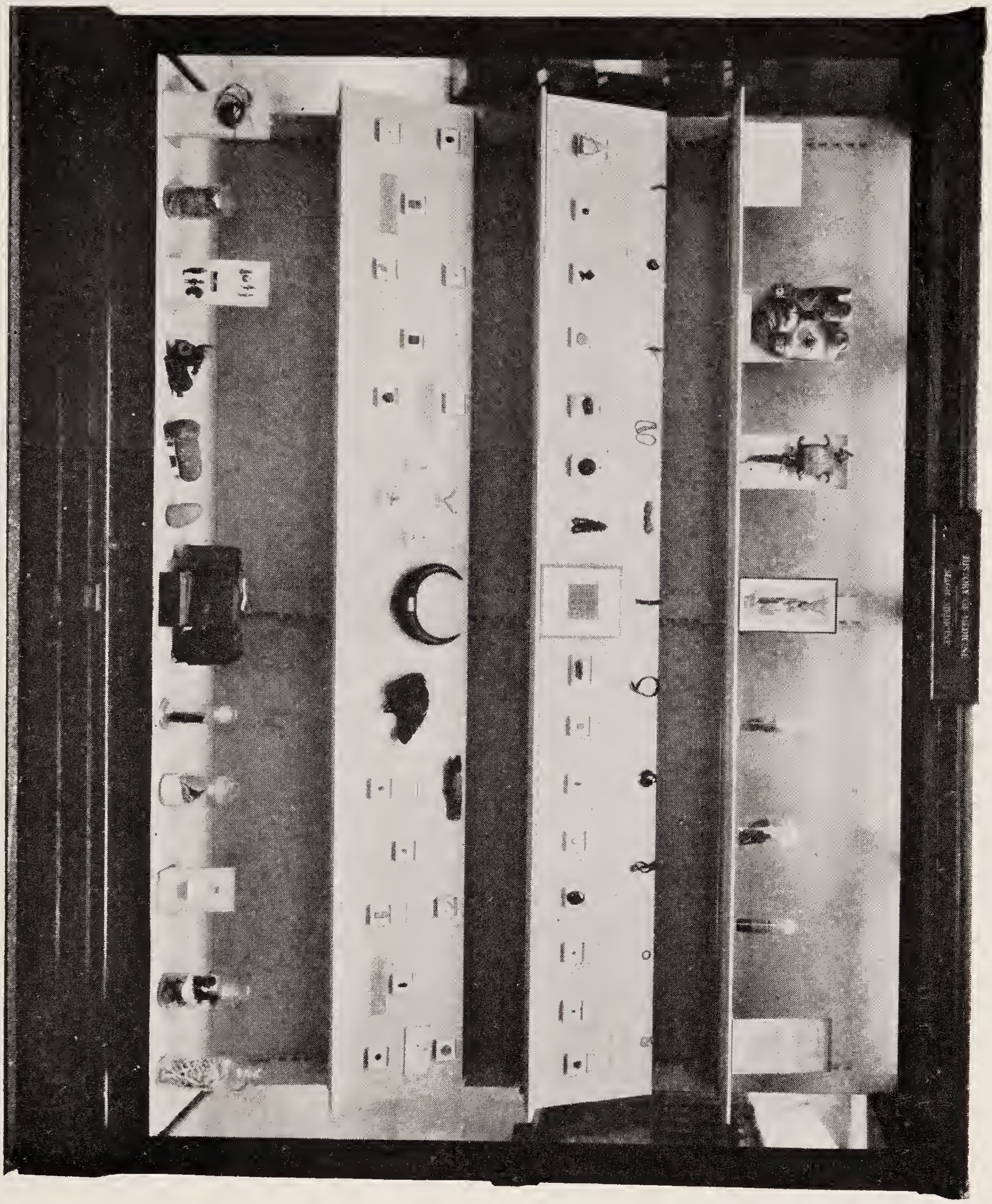
Magic medicine: Exorcism; invocation; incantation; amulets and charms; talismans; fetiches; transference of disease; signatures; the evil eye; sympathetical cures.

Psychic medicine: Music; metallotherapy; laying on of hands; royal touch; hypnotism.

Pharmacological medicine: Egyptian medicine; Greek and Roman medicine.

MAGIC MEDICINE.

Magic is the "pretended art of producing supernatural effects by bringing into play the action of supernatural or spiritual beings, of departed spirits, or of the occult powers of nature." Its application to the treatment of disease is magic medicine. The agents may be



MEDICAL EXHIBITS—MAGIC MEDICINE

FOR DESCRIPTION OF PLATE SEE PAGE 2

gods or demons, disembodied spirits of men, animals, plants, or minerals, or may be occult influences residing in, or exerted through, certain natural objects. These agents or influences are brought into action by invocations, sacrifices, incantations, and ceremonials of various kinds.

In so far as these magic arts produce physiological and remedial effects, which they undoubtedly sometimes do, they might be classified under the head of psychic or mind medicine, the mental state aroused by a firm belief in their efficacy causing modifications of physiological function and even tissue change.

Magic medicine is especially characteristic of the earlier stages of human development, when all natural forces were personified, and disease and death believed to be caused by malignant spirits.

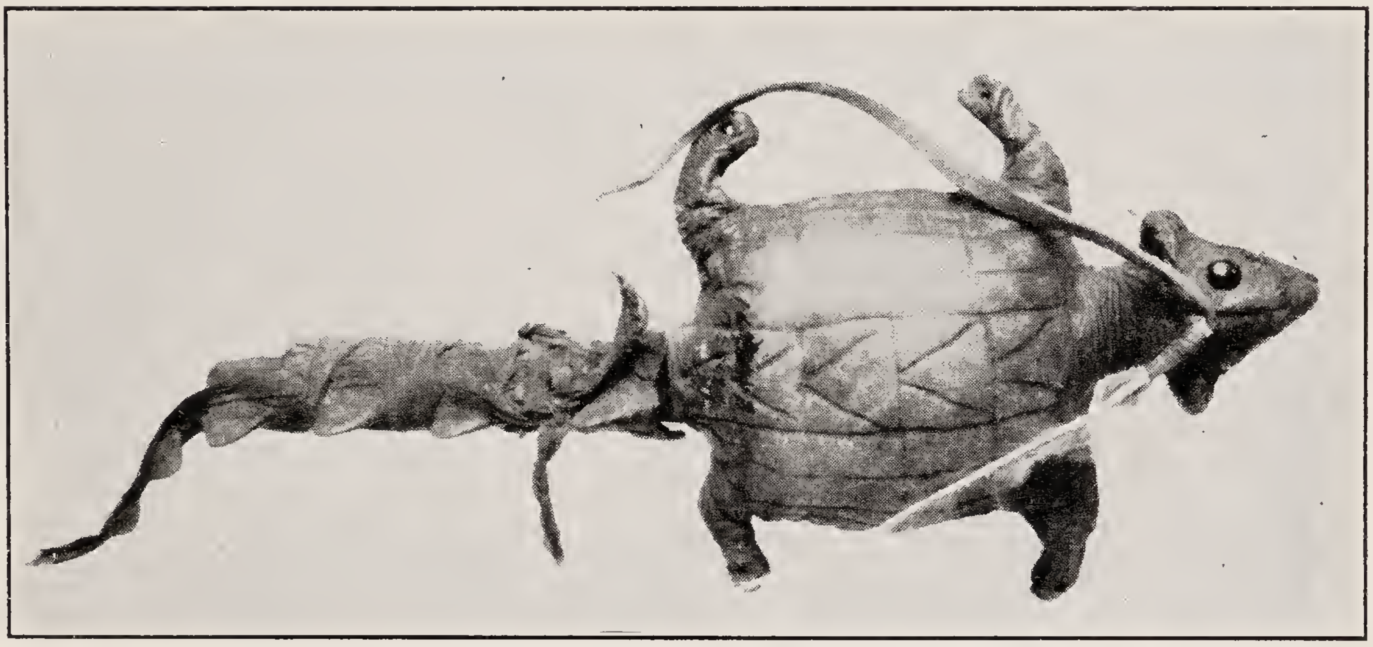


FIG. 1.—INDIAN MEDICINE MAN'S RATTLE.

The collection only outlines the subject of magic medicine, which covers a wide field for investigation and illustration.

Exorcism.—Casting out evil spirits by religious or magic formulas or ceremonies. A mode of healing the sick as old as the history of medicine. Has been practiced by the people of all ages and in all stages of civilization. It is still an authorized religious ceremony.

Indian medicine man's rattle.—Made of wood, covered with buckskin in imitation of a turtle. Used in the ceremonies of exorcism (fig. 1). Cat. No. 165,848, U.S.N.M.

Animal mask.—Worn by Indian medicine man in the practice of exorcism (fig. 2). Cat. No. 67,957, U.S.N.M.

Invocations.—Prayers for the assistance of disembodied spirits of animals or men, or the mythical gods and heroes, or of the Deity, commonly used as an accompaniment of other remedial measures, are among the oldest, most persistent, and most widely diffused of the means employed for the cure of disease.

Isis.—One of the principal deities of ancient Egypt. The following prayer was used while preparing medicines, and before taking the same:

> May Isis heal me, as she healed Horus of all the ills inflicted upon him when Set slew his father Osiris. O Isis, thou great enchantress, free me, deliver me from all evil, bad and horrible things, from the God and Goddess of evil, from the God and Goddess of sickness, and from the unclean demon who presses upon me, as thou didst loose and free thy son Horus. Baas's History of Medicine.

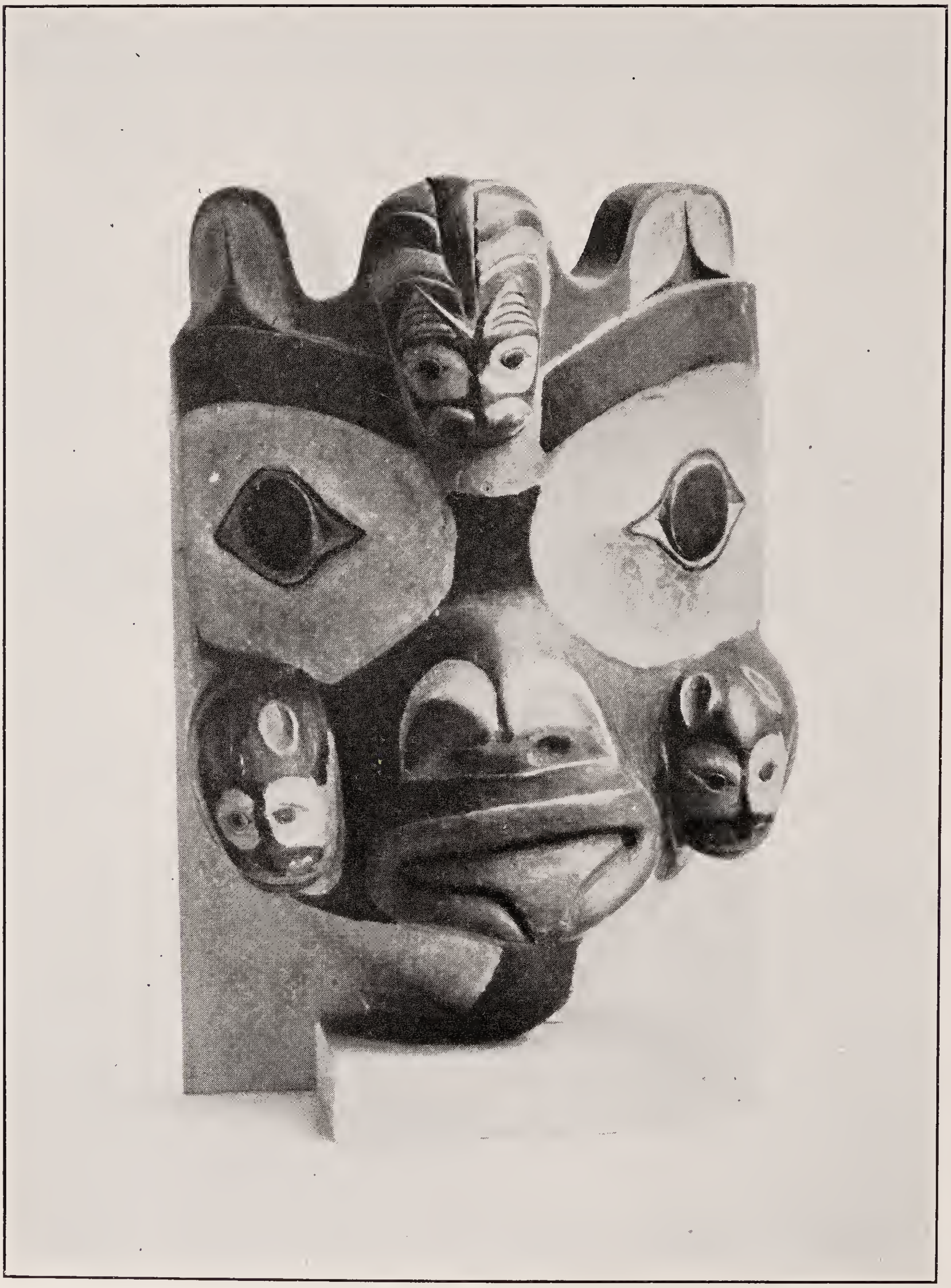


FIG. 2.—ANIMAL MASK.

Indian invocations. Fern roots.—For the cure of rheumatism. The common belief of the Indians regarding rheumatism is that it is caused by the revengeful spirits of slain animals, especially deer. The disease can only be driven out by some more powerful animal spirit. The doctor invokes the aid of the Red Dog of the East, the Blue Dog of the North, the Black Dog of the West, the White Dog of the South, and finally the White Terrapin of the Mountain, in separate prayers. While reciting the prayers the doctor rubs the afflicted part with a warm solution of fern roots and at the end of each appeal he blows once upon the part. Cat. No. 143,087, U.S.N.M.

Incantations.—Magical words said or sung. A mode of treatment employed by the Persians and Greeks, and transmitted by tradition down to the "folk-medicine" of the present day.

Abracadabra.—This was one of the most famous of the ancient incantations employed in medicine. Its mystic meaning has been the subject of much ingenious investigation, but even its derivation has not been agreed upon. The first mention of the word is found in the poem "De Medicina Praecepta Saluberrima," by Quintus Serenus Samonicus, a noted physician in Rome in the second and third centuries. In addition to being used as an incantation it was used as an amulet or charm. "Write several times on a piece of paper the word 'Abracadabra,' and repeat the words in the lines below, but take away letters from the complete word and let the letters fall away one at a time in each succeeding line. Take these away ever, but keep the rest until the writing is reduced to a narrow cone. Remember to tie these papers with flax and bind them round the neck." After wearing the charm for nine days it had to be thrown over the shoulder into a stream running eastwards. This incantation and charm was believed to be beneficial in treating fevers and various other diseases (fig. 3).

ABRACADABRA
ABRACADABR
ABRACADAB
ABRACADA
ABRACAD
ABRACA
ABRAC
ABRA
ABR
AB
A

abracadabra
abracadabr
abracadab
abracada
abracad
abraca
abrac
abra
abr
ab
a

ABRACADABRA
BRACADABR
RACADAB
ACADA
CAD
A

FIG. 3.—ABRACADABRA.

Incantation.—"A prayer and incantation for visiting of sick folkis." Used by Agnes Sampson, a famous witch of England, who was burned in 1590.

"All kindis of illis that euer may be,
In Chrystis name I conjure ye,
I conjure ye, baith mair and less,
By all the virtues of the mess,
And rycht sa, by the naillis sa,
That naillit Jesu, and na ma,
And rycht sa by the samyn blude,
That reiket ower the ruthful rood,
Furth of the flesh and of the bane,
I conjure ye in Goddis name."

Amulets and charms.—Amulets are material charms whose purpose is to protect the wearer against real or imagined dangers—witchcraft, evil eye, sickness, disease, acccidents, etc. They are of various kinds and formed of different substances: Natural, as stones of a peculiar shape, roots, leaves, seeds, horns, teeth and claws of animals, various metals, etc., or artificial, as rings, strings, representations of the hand, eye, crescent, beads, etc., and written charms, quotations from sacred writings. The use of charms is practically world-wide, wherever the belief in witchcraft, evil eye, and demons is specially pronounced. But they are in special favor with the eastern nations and are very common in Mohammedan countries. The Mohammedans frequently use as amulets either a small copy of the whole Koran, the sacred book of the Mohammedan religion, or certain portions of it. The writing is covered with waxed cloth to preserve it from accidental pollution, and inclosed in a case of gold or silver, which is attached to a silk string, or a chain.

Peony root.—Carried in the pocket as a preventive of insanity. The root, or a necklace of beads, is suspended from the necks of children to prevent convulsions, and to cure epilepsy. Cat. No. 143,069, U.S.N.M.

Chestnut.—A horse-chestnut (begged or stolen) carried habitually in the pocket, as a preventive of rheumatism. A widely spread superstition among all classes of society. Cat No. 143,070, U.S.N.M.

Scarlet silk.—A skein of scarlet silk thread, tied with nine knots, worn around the neck to prevent bleeding at the nose. Cat. No. 143,071, U.S.N.M.

Rabbit's foot.—The right forefoot worn in the pocket to prevent rheumatism. Cat. No. 143,068, U.S.N.M.

Mistletoe.—Small branches of the mistletoe, *Viscum album*, worn suspended from the neck as a specific against epilepsy, and an antidote for poisons. It should be cut with a gold knife, and when the moon is only six days old. Cat. No. 143,102, U.S.N.M.

Amulet.—A leather strap, with buckle, made from a part of a harness which has been worn by a horse. Firmly buckled around the wrist, and worn constantly, it greatly strengthens the muscles and ligaments, and cures sprains and other local affections. Cat. No. 143,111, U.S.N.M.

Amulet.—A spider put in a nutshell, and worn around the neck, was an ancient and famous remedy for ague, from the time of Dioscorides. Its fame has descended to recent times.

> " Only beware of the fever, my friends,
> beware of the fever!
> For it is not like that of our
> Acadian climate,
> Cured by wearing a spider hung around
> one's neck in a nutshell!"
> Longfellow's " Evangeline."

Cat. No. 143,110, U.S.N.M.

Cramp bone.—The patella, or " kneecap," of a sheep. To cure cramp. Worn next to the skin during the day, and laid beneath the pillow at night. Cat. No. 143,112, U.S.N.M.

Cramp ring.—A ring made from a nail that has been used to fasten a coffin, and that was dug out of a graveyard. A sovereign charm against cramps. Used in China, England, and occasionally in the United States. Cat. No. 143,114, U.S.N.M.

Voodoo, hoodoo, obi, or obeah.—A species of magic art or sorcery practiced by the African negroes, and continued to some extent by their descendants in the West Indies and the United States. The amulets or talismans used are usually bones, hair, teeth, feathers, rags, bits of wood, etc. This specimen consists of a chicken feather, some human hair, a drop of blood on a bit of rag, and a pine sliver. All are tied together and sewn in a piece of shirting. The amulet is worn on the neck as a preventive medicine, a cure-all, and to prevent the working of a "voodoo" on or against the wearer. Cat. No. 143,106, U.S.N.M.

Madstone.—Model, cut from the mineral halloysite, of a "madstone" in actual use. Believed to be the mineral of which some of the famous madstones are composed. It absorbs moisture with avidity, and adheres to a moistened surface until nearly saturated. Applied to the wound produced by the bite of a mad dog, it is said to adhere until the poison is entirely absorbed. The stone is then boiled in milk to remove the poison. Cat. No. 143,103, U.S.N.M.

Madstone.—A highly polished seed of *Gymnocladus dioica*, the Kentucky coffee tree, like the one in the Museum's collection, was offered to the Smithsonian Institution as a genuine madstone of proved efficacy for the sum of $1,000. Cat. No. 143,104, U.S.N.M.

Madstone.—A biliary calculus, or gallstone, formed in the gall bladder of an ox. One of the earliest forms of madstones. Ibn Baithar (1248 A. D.) ascribes to it the power of attracting the poison of venomous animals. It was applied to snake bites as well as dog bites. Cat. No. 49,360, U.S.N.M.

Madstone.—Said to have been found in the stomach of a deer, by an Apache Indian of New Mexico. It is a pebble of carbonate of lime, which may have been swallowed by a deer with his food or water, and the surface etched by the action of the gastric juices. Sent to the Museum as a veritable madstone. Cat. No. 143,190, U.S.N.M.

Madstone.—A reputed madstone purchased from Mr. J. R. Scott, Cable, Wis. A brown, striated, porous pebble, deriving its attributed powers, no doubt, from its peculiar appearance and the not unusual fact that the person bitten by the dog recovered after the application of the stone. Cat. No. 143,492, U.S.N.M.

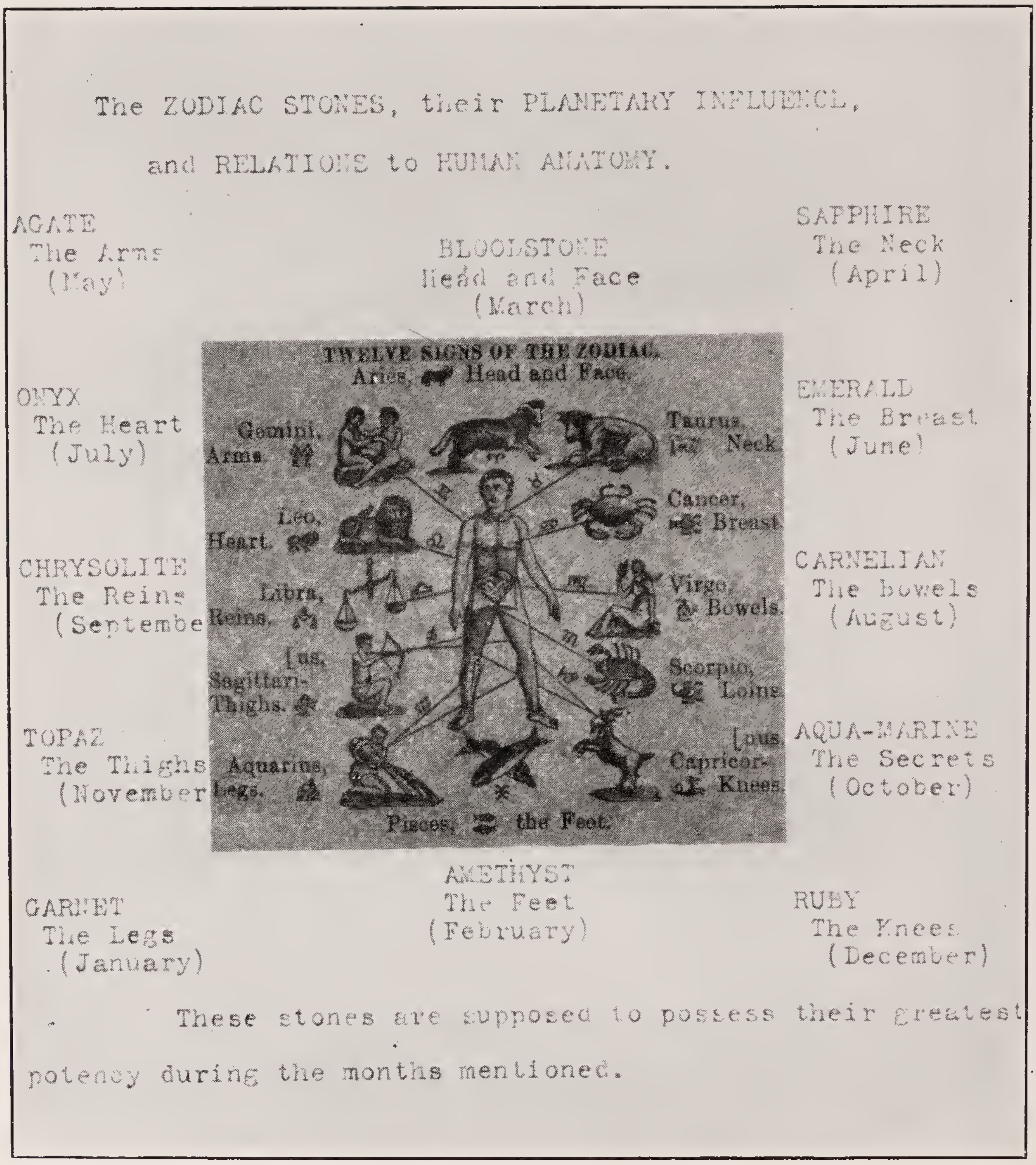
Madstone.—A ball of matted hair, such as is occasionally found in the stomach of domesticated cattle, buffaloes, and perhaps other ruminants. Two balls of this kind were sent to the Museum from Alva, Okla., in 1906, as veritable madstones. One of them was said to have been successfully used in two cases of dog bite. Cat. No. 143,201, U.S.N.M.

Coral.—Stops every flux of blood; drives away ghosts, illusions and dreams; hardens diseased gums; cleanses putrid sores; relieves pains in the stomach; and, taken in powder with wine, it cures gravel. Hung on fruit trees it insures fertility and protects from hail and blighting wind. In great repute during the Middle Ages both as a drug and as an amulet. Cat. No. 143,113, U.S.N.M.

Agate.—Emblematic of health; an enemy to all poisonous things; assuages thirst when held in the mouth. (Camillus Leonardus, fifteenth century.) Worn as an amulet for the cure of scrofula and skin diseases. (Albertus

Magnus, thirteenth century.) In Persian and Arabian medicine given internally, or worn in a finger ring for insanity, hemorrhages, gravel, etc.; bound upon the thighs of parturient women to facilitate labor. Used at the present day in Syria as a remedy for the "Aleppo boil." Cat. No. 143,118, U.S.N.M.

Onyx.—A powerful aphrodisiac and oxytocic. Used as an eyestone "it enters of its own accord, and if it finds anything within that is noxious it drives it out and tempers the hurtful and contrary humors." (Camillus Leonardus.) Said to cause nightmare, for the reason that "in the onyx is a demon, imprisoned in the stone, who wakes only of a night, causing terror and disturbance to sleepers who wear it." (Benoni.) Used at the present day by the Persians for the cure of epilepsy. Cat. No. 143,133, U.S.N.M.


TWELVE SIGNS OF THE ZODIAC.
Aries, ♈ Head and Face.
Gemini, Arms. ♊
Taurus, ♉ Neck.
Leo, Heart. ♌
Cancer, ♋ Breast.
Libra, Reins. ♎
Virgo, ♍ Bowels.
Sagittarius, Thighs. ♐
Scorpio, ♏ Loins.
Aquarius, Legs. ♒
Capricornus, ♑ Knees.
Pisces, ♓ the Feet.

The ZODIAC STONES, their PLANETARY INFLUENCE,

and RELATIONS to HUMAN ANATOMY.

AGATE
The Arms
(May)

BLOODSTONE
Head and Face
(March)

SAPPHIRE
The Neck
(April)

ONYX
The Heart
(July)

EMERALD
The Breast
(June)

CHRYSOLITE
The Reins
(Septembe

CARNELIAN
The bowels
(August)

TOPAZ
The Thighs
(November

AQUA-MARINE
The Secrets
(October)

GARNET
The Legs
(January)

AMETHYST
The Feet
(February)

RUBY
The Knees
(December)

These stones are supposed to possess their greatest potency during the months mentioned.

FIG. 4.—THE ZODIAC STONES.

Topaz.—Said to restrain anger, cure insanity, check hemorrhage, impart strength and good digestion. The powder taken in wine cures asthma and insomnia. "Rubbed on a hone the topaz gives a milky juice, and yet loses none of its weight." This juice taken internally for dropsy. (Epiphanius.)

Worn as an amulet it drives away sadness, strengthens the intellect, and bestows courage. (Porta.) Cat. No. 143,139, U.S.N.M.

Garnet.—Dispels poisonous and infectious airs. (Camillus Leonardus.) Like the ruby it foretells misfortune. Suspended from the neck it wards off the plague and thunder; taken internally it cures epilepsy, insanity, cholera, snake bite, and neutralizes drug poisons. Cat. No. 143,129, U.S.N.M.

Bloodstone.—Said to bring safety and long life to its possessor, and to be antidote to poisons. (Camillus Leonardus.) A remedy for dyspepsia. If "washed according to medicinal art" it was a styptic. In powder it was applied to ulcers, and, mixed with honey or white of egg, it was believed to be an excellent remedy for hard tumors. (Albertus Magnus.) Cat. No. 143,122, U.S.N.M.

Amethyst.—As an amulet it dispels sleep, sharpens the intellect, prevents intoxication, and promotes chastity. An antidote for all poisons. (Albertus Magnus.) According to Pliny, the amethyst is an antidote to drunkenness, "for being bound on the naval it restrains the vapor of wine, and dissolves ebriety." In Hindu medicine it is said to give strength, abate the heat of fevers, and cure fistula. Cat. No. 143,119, U.S.N.M.

Jasper.—Checks hemorrhages, strengthens the chest, lungs, and stomach, cures fevers and dropsy, and clears the sight. (Camillus Leonardus.) Galen (2nd Century) recommends that it be worn next the skin over the stomach, for the relief of dyspepsia. Burton (Anatomy of Melancholy) says: "If hung about the neck, or taken in drink, it much resisteth sorrow." Cat. No. 143,130, U.S.N.M.

Sapphire.—Among the Hindus the sapphire, unless perfectly flawless, was an unlucky stone. In the Middle Ages it was said to cure boils, carbuncles, and headaches, rested and refreshed the body, and gave color to the cheeks. (Camillus Leonardus.) Galen administered vinegar in which a sapphire had been soaked, in fevers. An ointment made with the powder cured inflammation of the eyes. Because of its extreme coldness it was thought to preserve the chastity of the wearer, and hence especially suited for ecclesiastical rings. The Buddhists esteem the sapphire, as a protective charm, above all gems. Cat. No. 143,138, U.S.N.M.

Carnelian.—Said to cure tumors and all wounds made by iron. (Epiphanius.) Preserved the strength, prevented hoarseness, and cleared the voice. In powder or worn as an amulet, it was supposed to be a sovereign remedy for hemorrhage. Rings cut from the stone are still worn to prevent bleeding from the nose. Cat. No. 143,123, U.S.N.M.

Ruby.—In Persian and Arabian medicine it was said to cure epilepsy, insanity, cholera, hemorrhage from the lungs, snake bite, and the effects of poisonous drugs; it purified the blood and freed the air from the infection of cholera. In the Middle Ages it was an amulet against poisons, plague, sadness, or evil thoughts; forewarned of danger by losing color. "It takes away vain thoughts, reconciles differences among friends, and makes a mighty increase of prosperity." (Camillus Leonardus.) Cat. No. 143,137, U.S.N.M.

Lapis lazuli.—Believed to cure melancholia. Used at the present day in India, Chile, and Peru as a laxative. In Hindu medicine it was regarded as a cooling medicine, and curative of biliousness. Cat. No. 143,131, U.S.N.M.

Chrysoberyl.—As an amulet it dispels evil dreams, fear, and melancholy. Possesses the general qualities of beryl. In Hindu medicine the chrysoberyl, set in gold and worn on the neck or hand, said to remove diseases and vicious habits, and to increase family, life, and happiness. Is also believed to lose its brilliancy in contact with poisons. Cat. No. 143,126, U.S.N.M.

Beryl.—Formerly much used in divination, as it was supposed to be the abode of spirits. As a remedy the powdered stone was taken internally for leprosy. Water in which the stone had lain was used as a lotion for the eyes, and was taken internally for flatulency and disorders of the liver. Cat. No. 143,121, U.S.N.M.

Amber.—Supposed to be "generated out of the urine of the lynx, and hardened by time." "It assuages pain in the stomach, and cures jaundice, flux, and kidney evil;" a remedy for all diseases of the throat. (Camillus Leonardus.) Often worn, in this and other countries, as an amulet for the relief of toothache and dropsy, and for the prevention of asthma, croup, and various infectious diseases. It is still used for the cure of goiter. Cat. No. 143,120, U.S.N.M.

Chalcedony.—Prevented and cured melancholy. Worn as an amulet it was preventive of danger during tempests and sinister events. (Camillus Leonardus.) Cat. No. 143,125, U.S.N.M.

Lodestone.—Magnetic iron ore. "Being carried about one it cures cramps and gout. In the hour of travail, if held in the hand, it facilitates the birth. If bruised and taken with honey, it cures dropsy; and the head being anointed with it cures baldness." "It also taketh away fears and jealousies, and reconciles wives to their husbands, and husbands to their wives." (Camillus Leonardus.) Cat. No. 143,132, U.S.N.M.

Opal.—In great repute as an eyestone and a remedy for all diseases of the eye. It preserves from contagious and infectious airs, drives away despondency, prevents fainting, heart disease, and malignant affections. (Giov. B. Porta, Magiae naturalist, sixteenth century.) Indicates the state of health of wearer, losing its brilliancy when the person is ill. Cat. No. 143,134, U.S.N.M.

Pearls.—In Egyptian medicine an electuary of pearl powder was said to strengthen the body and give luster to the eyes. Largely used in China as an aphrodisiac and medicine for hemorrhage, stomach troubles, etc. In Persian and Arabian medicine pearls were said to cure all mental diseases. In Europe, so late as the seventeenth century, they were used as a remedy for insanity. A decoction of pearl powder in distilled water was one of the remedies given to the insane Charles, King of Spain. Cat. No. 143,135, U.S.N.M.

Quartz.—According to Hindu authorities, the crystal, worn as an amulet, removed baneful astral influences, cured biliousness, fever, and fistula, and was a specific for leprosy and consumption. In the Middle Ages it was given, in powder, for dysentery. A crystal held against the tongue assuaged the thirst of fevers, neutralized snake poison, and protected the wearer from drowning, fire, and thieves. Cat. No. 143,136, U.S.N.M.

Turquoise.—Worn as an amulet to protect from accident and to insure health and success; it was also said to protect from drowning, lightning, and snake bite. In Arabian and Persian medicine it was said to cure diseases of the head and heart, hernia, tumors, strictures, epilepsy, insanity, and cancer. In Egypt cataract is said to be cured by the local application of a turquoise which had been dipped in water, the application being accompanied by the chanting of the name Allah. Cat. No. 143,140, U.S.N.M.

Zircon.—A charm against plague, evil spirits, and lightning. Cat. No. 143,141, U.S.N.M.

Cat's-eye.—Applied to the throat for the relief of croup. Tied in the hair of parturient women to facilitate labor. In Hindu medicine the cat's-eye was said to be "warm and sour" and curative of cold, chronic derangement of the spleen, and colic. The Persians used the powdered stone as a remedy for dropsy. Cat. No. 143,124, U.S.N.M.

Disk cut from a human skull.—Found in Long's Hill, near Florence, Nebr., 6 feet 2 inches from the surface, among other human bones, flint chips, and various Indian remains. Probably used as an amulet or fetich. Cat. No. 143,462, U.S.N.M.

Deer's foot.—For the cure of toothache, swellings, and itching eruptions. It is to be warmed and rubbed over the painful or swollen parts. Cat. No. 143,097, U.S.N.M.

Snake slough.—The epidermis of a snake. In England it is bound around the forehead and temples to cure headache. It is also used for extracting thorns. If the thorn is in the palm, the slough is applied to the back of the hand. Cat. No. 143,115, U.S.N.M.

Belemnite.—Regarded as a thunderbolt. Cat. No. 143,480, U.S.N.M.

Lucky "holed stone."—Cat. No. 143,481, U.S.N.M.

Stone for curing cows of sickness.—Cat. No. 143,482, U.S.N.M.

Penny.—A penny, bored, and worn as a charm. Cat. No. 143,483, U.S.N.M.

Miscellaneous medicinal and religious amulets, made in England, and used in trading with the natives of certain countries.

Rosary.—A trade rosary of carnelian. Cat. No. 143,463, U.S.N.M.

Amulet for the Gold Coast of Africa.—Cat. No. 143,464, U.S.N.M.

Shell amulet for Madagascar.—Cat. No. 143,465, U.S.N.M.

Shell amulet for the Congo.—Cat. No. 143,466, U.S.N.M.

Tiger's tooth amulet for the Congo.—Cat. No. 143,467, U.S.N.M.

Leopard's tooth amulet for the Congo.—Cat. No. 143,468, U.S.N.M.

Glass cowries for the Congo.—Cat. No. 143,469, U.S.N.M.

Crescent beads for Zanzibar.—Cat. No. 143,470, U.S.N.M.

Glass amulet for India.—Cat. No. 143,471, U.S.N.M.

Glass amulet for the Soudan.—Cat. No. 143,472, U.S.N.M.

Carnelian beads for the Gold Coast.—Cat. No. 143,473, U.S.N.M.

Tubular beads for the Congo.—Cat. No. 143,474, U.S.N.M.

Pendant amulets for the Gold Coast.—Cat. No. 143,475, U.S.N.M.

Amber beads (curative) for Zanzibar.—Cat. No. 143,476, U.S.N.M.

Coral beads for the Congo.—Cat. No. 143,478, U.S.N.M.

Charm necklet for the Gold Coast.—Cat. No. 143,479, U.S.N.M.

Talismans.—Images or other material objects, generally bearing cabalistic characters, words, or signs, supposed to work wonders whether kept in one's possession or not.

Talismans.—Small silver images of the whole or parts of the body, representing by form or attitude painful or diseased organs. These images are often hung in the churches in some countries, either as votive offerings after restoration to health, or as a material part of an invocation or appeal for Divine aid. (See fig. 5.) Cat. No. 73,945, U.S.N.M.

Talisman.—A small packet containing a chapter of the Koran, carefully folded, covered with leather, and protected from moisture by some resinous application. Used by the Soudanese warriors for protection against wounds and disease. Cat. No. 143,109, U.S.N.M.

Fetiches.—Material objects believed to be the dwelling of a spirit, or to represent a spirit, that may be induced or compelled to help the possessor.

Zuni fetich.—A clay image of the mountain lion. The spirit of the mountain lion guards the North, and is master of the gods of the hunt. The hunter makes invocation to the indwelling spirit of this image for assistance in the pursuit and capture of game and for protection against injury. Cat. No. 128,669, U.S.N.M.

Indian fetich.—Carved out of a block of wood in imitation of a naked Indian in the attitude of, and probably impersonating, a quadruped. One of the articles composing the outfit of an Alaskan Indian medicine man. (See fig. 6.) Cat. No. 143,105, U.S.N.M.

Fetich.—A conical ball of clay about 3 inches long by 2 inches in greatest diameter. Used in the magic medicine of the Kroos of western Africa. Cat. No. 4,805, U.S.N.M.

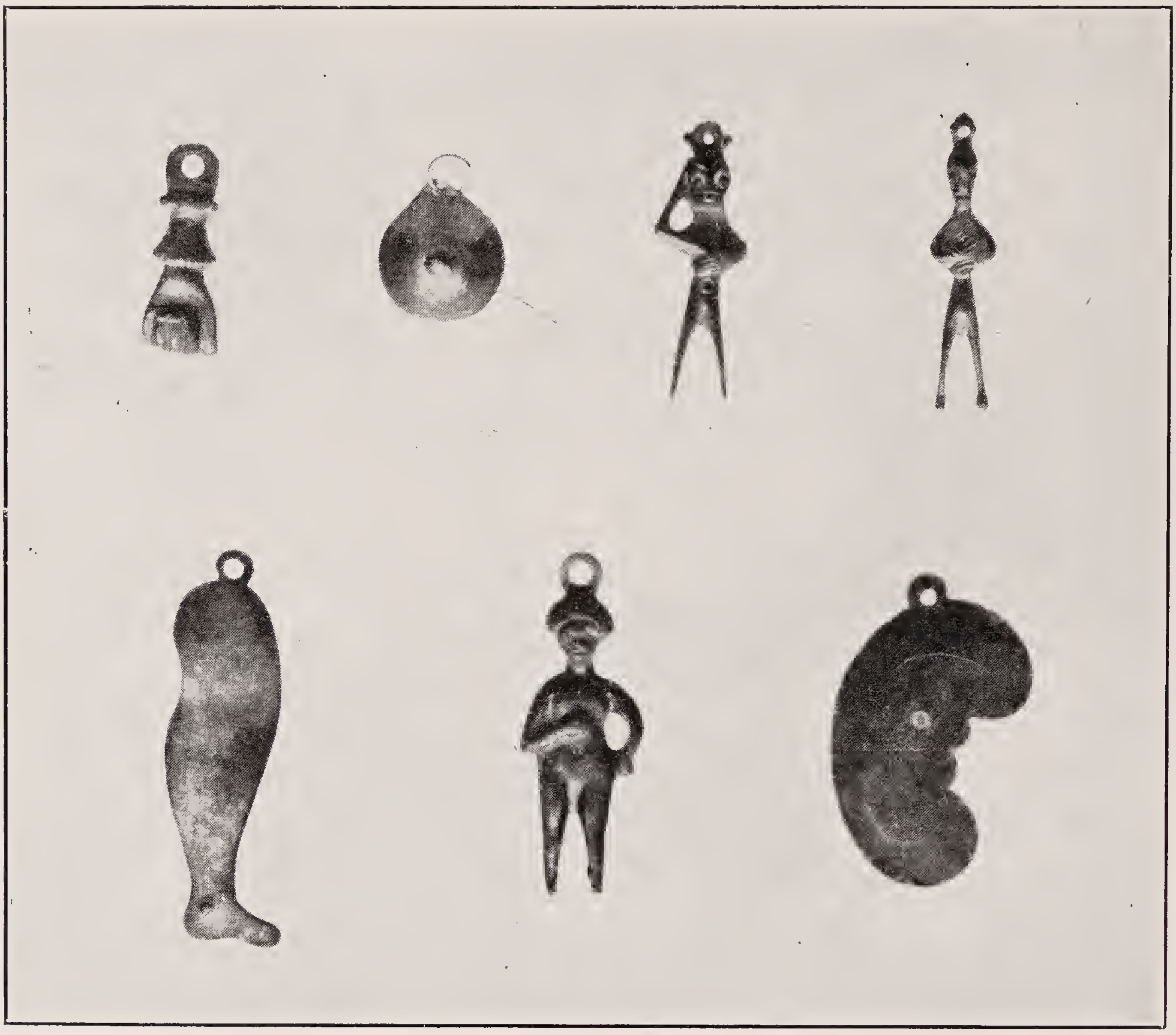


FIG. 5.—SMALL SILVER IMAGES.

Cherokee fetich.—A flint arrowhead is put into a decoction prepared for a vermifuge, in order that the indwelling spirit may communicate to the medicine the cutting quality of the stone, whereby the worms may be cut in pieces. Cat. No. 143,088, U.S.N.M.

Transference of disease.—One of the magic medical practices of all countries. "When disease was recognized, though tardily, to have positive existence, and the fact realized that, despite prayers and offerings, it might be mysteriously communicated by the sick to another person, * * * without conscious act on his part, * * * why might he not of purpose transfer his complaint to something of a lower order, which should suffer the disease in his place?" W. G. Black, in Folk-medicine.

Section of a tree grown on the Government grounds near the naval hospital, Norfolk, Va.—The tree had been tapped, human (negro) hair inserted in the hole, the hole plugged and sealed with clay. Four inches of new growth formed over the plug. Reckoning by count of the annual rings, the plug was inserted more than 50 years before it was found. The operation upon the tree was doubtless performed either (1) to relieve headache by transferring it to the tree by means of the hair; or (2) to cause pain in the head of the original possessor of the hair, the lock having been obtained by an enemy, placed in the hole made in the tree, and the plug driven down hard upon it.

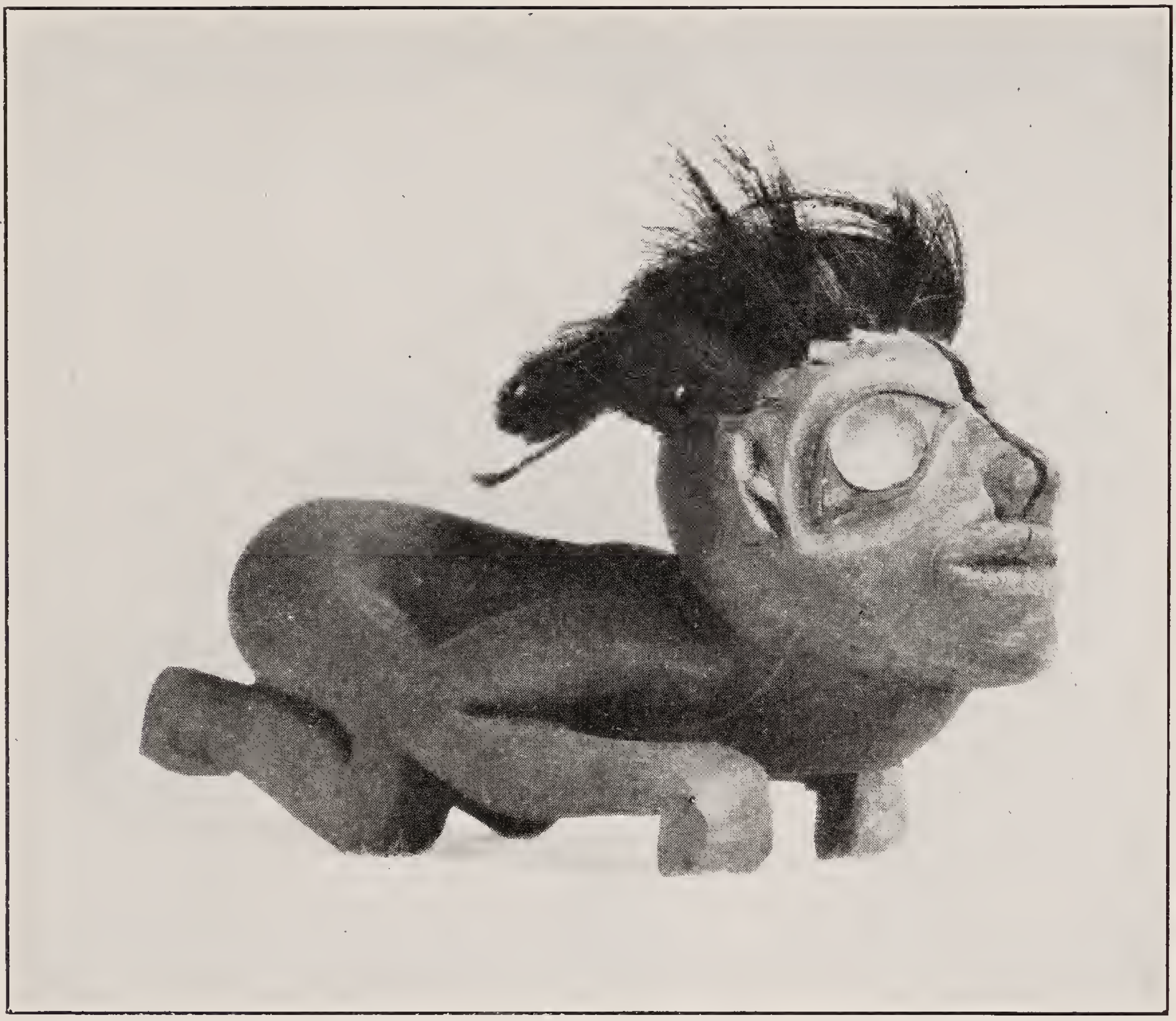


FIG. 6.—INDIAN FETICH.

> If you can get a few strands of your enemy's hair, bore a hole in a tree, put them in, and plug up the hole; you can thus give him a headache which can not be relieved until the hair is taken out of the tree. Encyclopedia of Superstitions. (See pl. 2.) Cat. No. 143,207, U.S.N.M.

Disease transference.—For warts: Rub the warts with a cinder; the cinder then to be tied up in a paper and dropped where four roads meet. The warts will be transferred to whoever opens the parcel. Berdoe, "The Origin and Growth of the Healing Art." Cat. No. 142,209, U.S.N.M.

Signatures.—Some outward sign appearing upon plants, minerals, and other objects, believed to point to their medicinal uses. This belief is very evident in oriental medical practice, and was prevalent in European countries up to the eighteenth century.

Vegetable lamb; golden-haired dog; Tartarian lamb.—The rhizome and base of the stipes of a fern (*Cibotium barometz*). The rhizome is densely covered with soft golden-brown hairs, and with the bases of the stipes for legs bears a rude resemblance to a small quadruped. It was one of the marvelous drugs of European pharmacy in the sixteenth and seventeeth centuries, and was believed to be a sort of plant animal. It was said to spring from a seed, and root in the earth like a plant, and to feed upon surrounding herbs like an animal, turning upon its root until it had devoured all within reach, when it perished from starvation. The rhizome is thought by the Chinese to be tonic and aphrodisiac. The fine hairs are an efficient styptic. (Fig. 7.) Cat. No. 142,607, U.S.N.M.

Stalactites.—"Moreover this stone, reduced to a fine powder and one ounce of it given inwardly, is wont efficaciously to provoke sweat; and in bones broke, being externally applied, mixed with convenient playsters, it is exceedingly helpful. If by the benefit of distilled vinegar, it be resolved into a salt, in the stone and knotted podagrical effects, by reason of its signature it efficaciously operates." (Crollius, Treatise of Signatures, 1669.) Cat. No. 49,357, U.S.N.M.

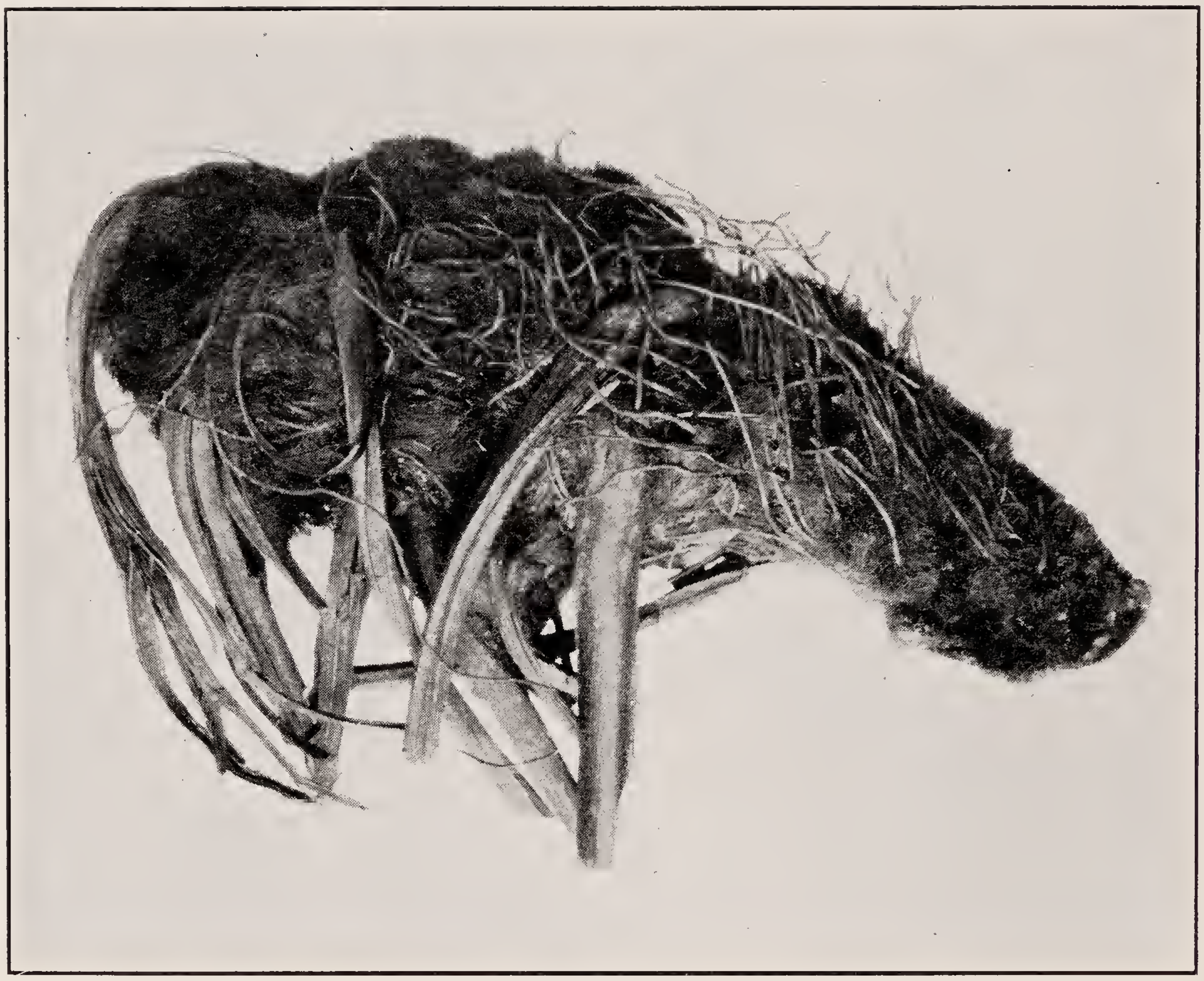


FIG. 7.—VEGETABLE LAMB.

Walnuts.—"Walnuts have an entire signature of the head; the exterior rinde, or herby encompassment, of the pericranium: Wherefore salt of the rindes, for wounds of the pericranium, is a singular remedy. The interior hard rinde, or wooddy shell, of the cranium. The thin skin encompassing the kernel, of the skin and membranes of the brain. The kernel hath the figure of the brain itself: Therefore it is also helpful to the brain. For if the kernel beaten be moistened with the quintessence of wine, and applied to the crown of the head, it comforts the brain and head wonderfully." (Crollius, Treatise of Signatures.) Cat. No. 143,089, U.S.N.M.

Evil eye.—The belief in the power of some persons to bring misfortune, sickness, and even death to men or animals by gazing at them, is one of the most ancient, widespread, and persistent of human superstitions. This belief was, and is universal among savage races everywhere; it was sanctioned by the classical authors, the fathers of the church, the medieval physicians, and is still a matter of implicit faith with the people of many countries. In former days, in England, people supposed to have the evil eye, were put to death, and so late as the seventeenth century two women, who were believed to have fascinated and thereby caused the death of the Earl and Countess of Rutland and their children, were executed. Every form of magic has been resorted to for defense against the evil eye, and objects innumerable, both natural and artificial, have been credited with this power.

Horns.—Horns, in one form or another, are, of all objects, the most common defense against the evil eye. The people of Senegal, Palestine, Greece, Holland, the Druses of Lebanon, the Jewesses of Tunis, the women of South America, the North American Indians, the Belgians and Saxons of old, all wore horns on their heads in some manner, on headdresses or helmets, to ward off that awful, universal, unescapable, mystic glance that has continually harassed man in all quarters of the globe. (See pl. 2.) Cat. No. 143,503, U.S.N.M.

Amulet.—A silver image of a merman, or Triton, with the body of a man and the tail of a fish. One of many variations of amulet almost universally worn by Italian children for protection from the evil eye and from sickness and accidents in general. In this form perhaps specifically to protect from drownings. Cat. No. 143,501, U.S.N.M.

Charms.—The charms illustrated in figure 8 are made in England for the Italian market where they are in general demand by the people, especially for the protection of children, who are supposed to be peculiarly susceptible to the evil eye. Cat. Nos. 143,484–143,487, U.S.N.M.

Sympathetical cures.—A curious chapter in the history of medicine is found in the popular belief in "sympathetical cures," which prevailed in England during the reigns of James I and Charles I.

Sympathetic powder—Calcined copper sulphate.—Powder formerly supposed to have the property of curing a wound, if applied to the weapon inflicting it, or a piece of the bloodstained garment. This method of healing was in high repute during the seventeenth century, and learned essays were written to prove that the unquestioned effects produced by the powder were neither diabolical nor magical but were caused by a peculiar emanation, which they called "magnetick."

"The method, and primitive manner how to make use of this sympathetical remedy, was to take onely some vitriol, and dissolve it in raine water, in such proportion, that putting therein a knife, or some polished iron, it should come out changed to the color of copper; and into this water they did put a rag of cloth embrued with the blood of the party hurt. And every time that one put new water of vitriol with fresh powder and new cloth, or other bloudied stuff, the patient should feel new easement as if the wound had been dressed with some sovereign medicament."

Sir Kenelmee Digby, "Touching the cure of wounds by powder of sympathy;" and J. B. Van Helmont, "A ternary of paradoxes." Cat. No. 143,504, U.S.N.M.

PSYCHIC MEDICINE

Psychic, or mind, medicine is a general term applied to methods of treating disease through mental impressions. States of mind are induced, or mental qualities stimulated to such a degree as to modify physiological function, and through such modified function even to produce tissue change. Confidence, hope, faith, are aroused, the imagination excited, the attention fixed by suggestion or individual effort, or certain peculiar mental conditions induced which are known by the names of mind healing, faith cure, mesmerism, hypnotism, etc.

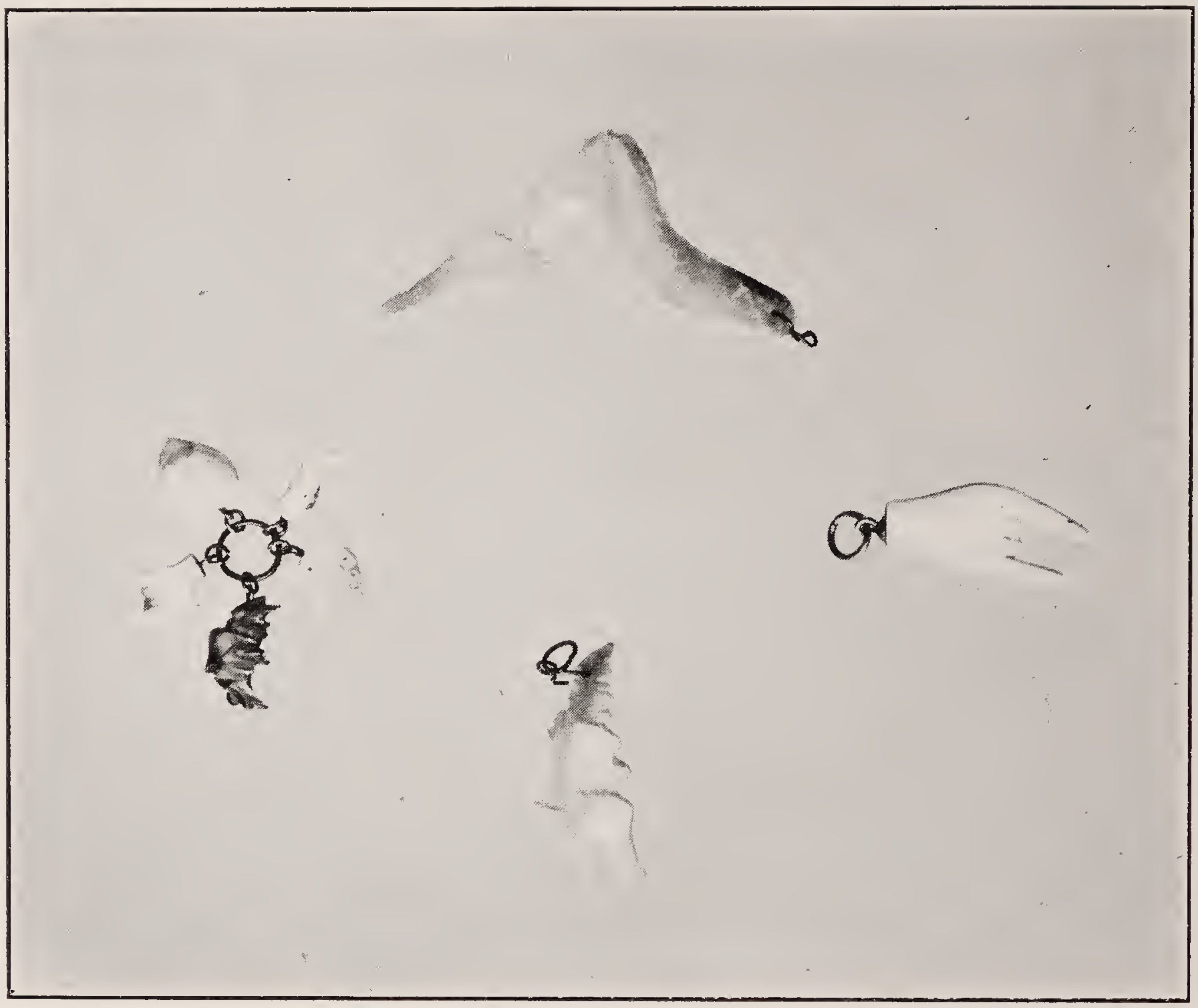


Fig. 8.—Charms Worn for Protection Against the Evil Eye.

All these psychic conditions may be established by sensory impressions, as by music (incantations), visual objects to fix the attention, eyestrain to modify consciousness, by manipulation, by personal influence (magnetism) of the mind doctor, or by mental effort on the part of the patient.

Since these methods rarely call for paraphernalia, implements, or apparatus of any kind, but are merely ceremonial, it is not possible to illustrate this form of medicine, except by a few objects.

Medical Exhibits—Psychic Medicine

For description of plate see page 16

Music.—The use of instrumental music in the treatment of disease is of very ancient origin. David is said to have cured Saul of an attack of melancholia (mania) by playing on the harp in his presence. The eminent Greek physicians Pythagorus, Hippocrates, Theophrastus, Galen, and others of renown recommended it.

Jean Battiste Porta, in the sixteenth century, advised that musical instruments be made of wood of medicinal plants, and affirmed that the music of these instruments would produce the medicinal effects of the plants.

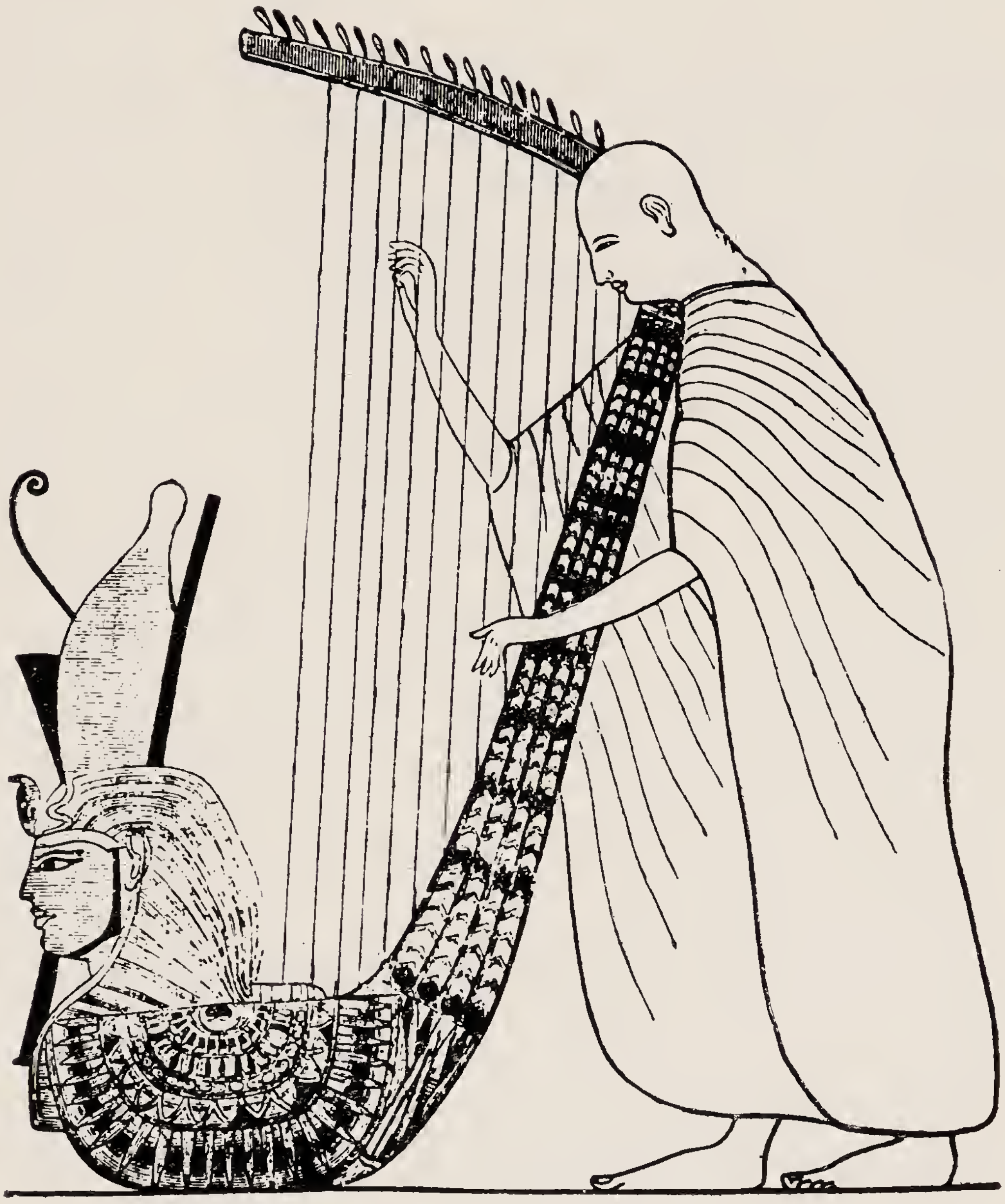


Fig. 9.—Egyptian Harp.

In later times it is said to have been successfully used in the treatment of the delirium of fevers, the plague, gout, poisoned wounds, to mitigate the pain of surgical operations, and especially in nervous affections such as hysteria and melancholia. It is found to be beneficial in the management of the insane, and musical entertainments are frequent in all modern institutions for their treatment.

Egyptian Harp.—From a wall painting in a tomb at Thebes. The harp illustrated in Figure 9 probably represents a larger and more elaborate form of the musical instrument used by David for the relief of Saul during an attack of melancholia.

"But the spirit of the Lord departed from Saul, and an evil spirit from the Lord troubled him. And it came to pass, when the evil spirit from God was upon Saul, that David took an harp and played with his hand; so Saul was refreshed and was well, and the evil spirit departed from him." (Samuel, xvi, 14–23.) Cat. No. 143,505, U.S.N.M.

Metallotherapy.—A method of curing disease by the application of metallic substances to the surface of the body. It has been advocated from the time of the middle ages to the present, principally as a prophylactic and a remedy for distinctly nervous diseases. In most instances this method of therapy falls under the head of mind medicine, appealing to the credulity and imagination of the patient.

Copper.—A plate of copper to be worn as a preventive of cholera, and a remedy for facial neuralgia and other nervous affections. Commonly used in Europe in the early part of the nineteenth century. (See pl. 3.) Cat. No. 143,149, U.S.N.M.

Mercury.—A small tube filled with mercury, worn suspended from the neck as a protection from the cholera. Said to have been used by many people in Germany during the first half of the nineteenth century. The custom had its origin in the immunity of workmen in quicksilver mines during an epidemic of cholera. Cat. No. 143,147, U.S.N.M.

Horseshoe.—There are many superstitions connected with the horseshoe, but in metallotherapeutics the healing effects of an old horseshoe were attributed to the magnetic quality acquired by long beating upon stony roads or pavements. It was believed to be a sovereign remedy for cramps, and was to be kept at the bedside where it could readily be seized in case of an attack. Cat. No. 143,148, U.S.N.M.

Laying on of hands.—Figure 10 is a copy of an illustration from "The Miraculous Conformist, or an Account of Marvailous Cures Performed by the Stroking of the Hands of Mr. Valentine Greatarick."

Valentine Greatarick, born in Ireland, attained great reputation, about the middle of the seventeenth century, by his marvelous cures of diseases by stroking with the hands. At first he confined his efforts to the cure of scrofula, or "King's evil;" subsequently he successfully treated patients with many other diseases, such as apoplexy, convulsions, palsy, etc.

"I saw him Stroke a man for a great and settled paine in his left Shoulder, which rendered his Arme uselesse: upon his stroking it the pain removed instantly into the end of the Musculus Deltodes: being stroked there, it returned to the Shoulder again: thence (upon a second stroking) it flew to the elbow, thence to the wrist, thence to the shoulder again; and thence to the fingers: whence it went out upon his last stroking, so as that he moved his arme vigorously every way."

By Henry Stubbe, physician, Oxford, 1666. Cat. No. 143,506, U.S.N.M.

Royal touch.—A mode of healing said to have originated with Edward the Confessor. (1004–1066.) It was practiced by succeeding kings and queens of England, with occasional exceptions, down to Queen Anne. (1664–1714.) A register of persons touched by King Charles II, from May, 1662, to April, 1682, gives the number at 92,107. Healing by touch was also practiced by the French kings, and it is claimed by some French historians that the custom originated in France. Until the time of Henry VII no peculiar ceremonies attended the practice of healing by touch. This monarch established a special religious service to be employed at the healings, during which a piece of gold (touchpiece) was presented to the patient, to be worn as an amulet suspended from the neck.

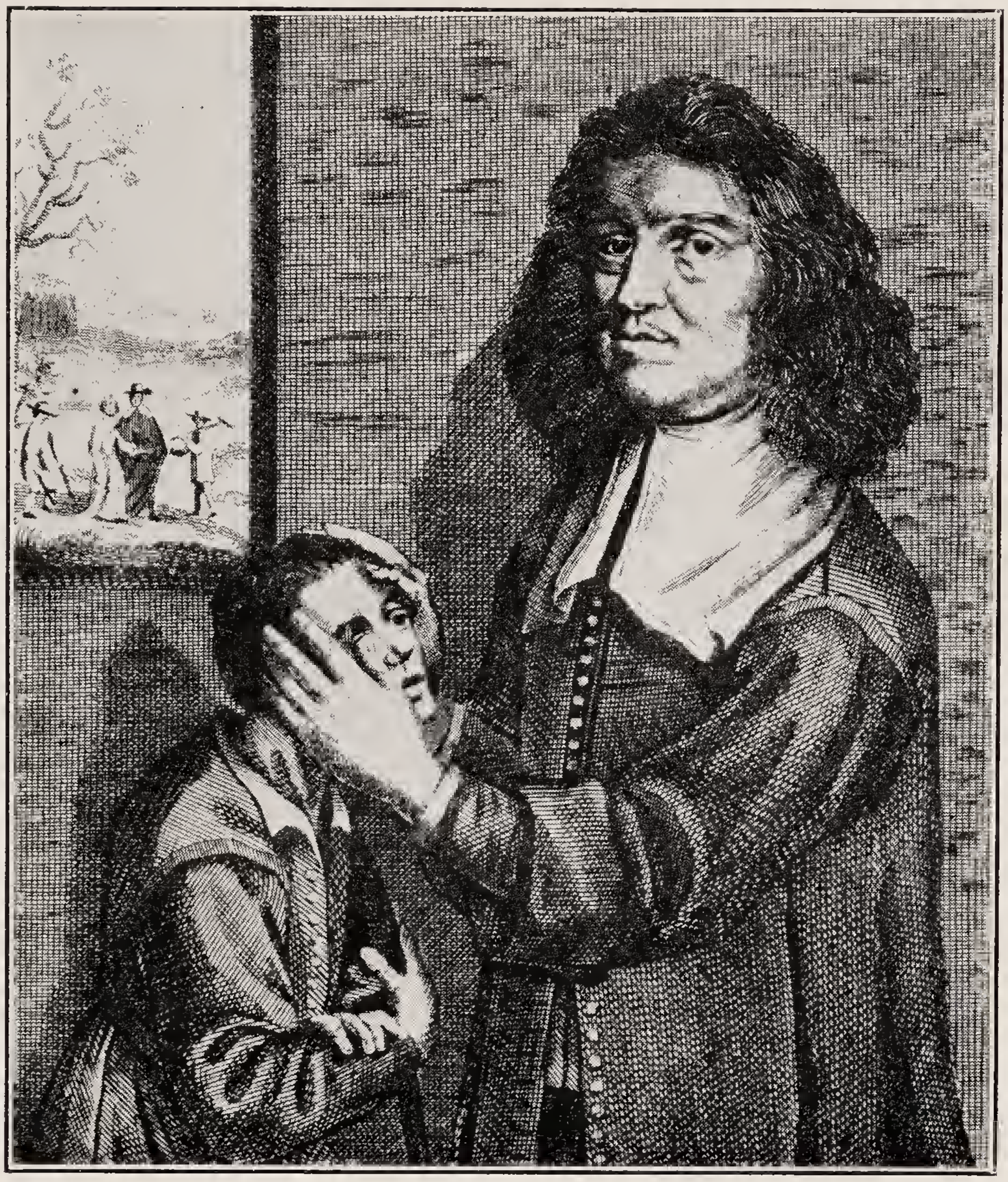
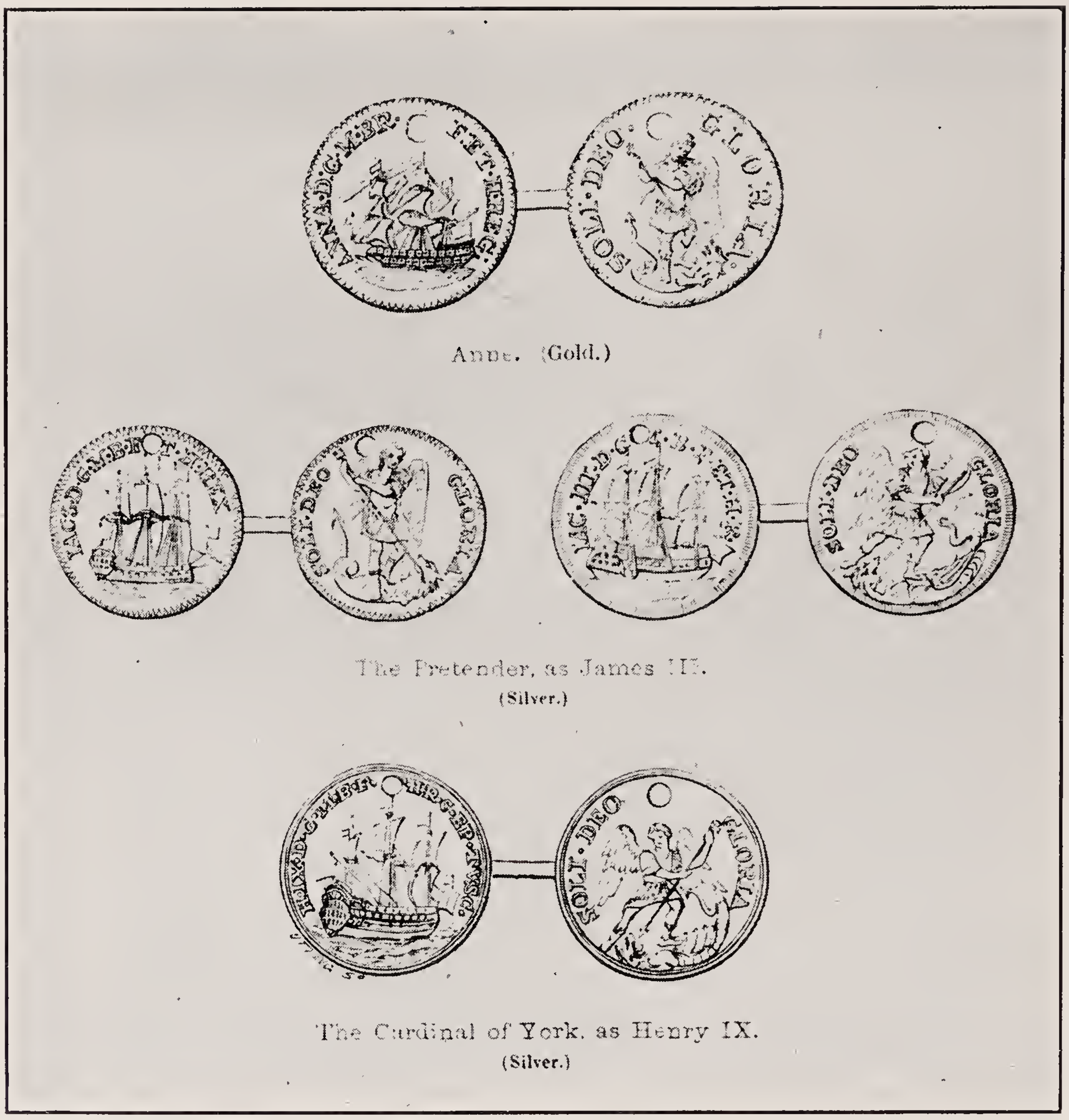


FIG. 10.—LAYING ON OF HANDS.

The ceremony of touching for scrofula, or King's evil, as practiced by Charles II, is described by Evelyn in his memoirs as follows: "July 6, 1660. His majestie sitting under his state in ye banquetting house, the chirurgeons cause the sick to be brought, or led up to the throne, where they kneeling, ye king strokes their faces or cheeks with both his hands at once, at which time a chaplaine in his formalities says: 'He put his hands upon them and he healed them.' This is said to everyone in particular. When they have all been touched they come up againe in the same order, and the other chaplaine kneeling, and having angel gold strung on white ribbon on his arme, delivers them one by one to his majestie, who puts them about the necks of the touched as they passe, while the first chaplaine repeats, 'That is ye true light who came into ye world.' Then follows an epistle (as at first a gospell) with the liturgy, prayers for the sick; lastly ye blessing; and then the lord, chamberlaine and comptroller of the household, brings a basin, ewer and towel, for his majesty to wash."

Touchpiece.—A gold coin of the time of Charles II of England, such as was used by that king in the ceremony of "touching" for the cure of scrofula, or King's evil. About four-fifths of an inch in diameter, bearing on one side figures of Saint George and the Dragon and the legend "Soli deo Gloria;" on the other a figure of a ship under sail, with the legend "Car. II, DG. M. B. FR. ET. HI. REX." Cat. No. 143,199, U.S.N.M.


Anne. (Gold.)

The Pretender, as James III.
(Silver.)

The Cardinal of York, as Henry IX.
(Silver.)

FIG. 11.—TOUCHPIECES FOR DISTRIBUTION AT THE HEALINGS.

Hypnotism.—Animal magnetism, mesmerism, somnambulism, trance, ecstacy. An artificially produced or self-induced mental state, in which the mind becomes more or less passive, and both consciousness and will may be controlled or abolished by the influence of command or suggestion. The mental impressions made by the senses may be perverted or enfeebled or interrupted, muscular irritability greatly increased, and various and often remarkable nervous phenomena exhibited. As one of the magic arts it was practiced by the ancient Egyptians, Hindus, and Greeks; as a demoniacal possession, or a miraculous interposition of Divine Providence, it is familiar in the religious history of every nation and period of time.

Friedrich Anton Mesmer. Born in Weil, Germany, in the year 1733; died in the year 1815. He gave the name to that form of psychic medicine known as mesmerism or hynotism. At first he effected cures by stroking the diseased parts of the body with magnets. Afterward, with the aid of the mysterious surroundings of the professed magician, he produced upon his patients the well-known nervous phenomena of hypnotism by a touch, by "passes" with his hands, or even by a look. Though many of his methods were those of the charlatan, yet the effects produced were real, and were attributed by him to what he called animal magnetism, and not to any form of magic. (See pl. 3.) Cat. No. 143,151, U.S.N.M.

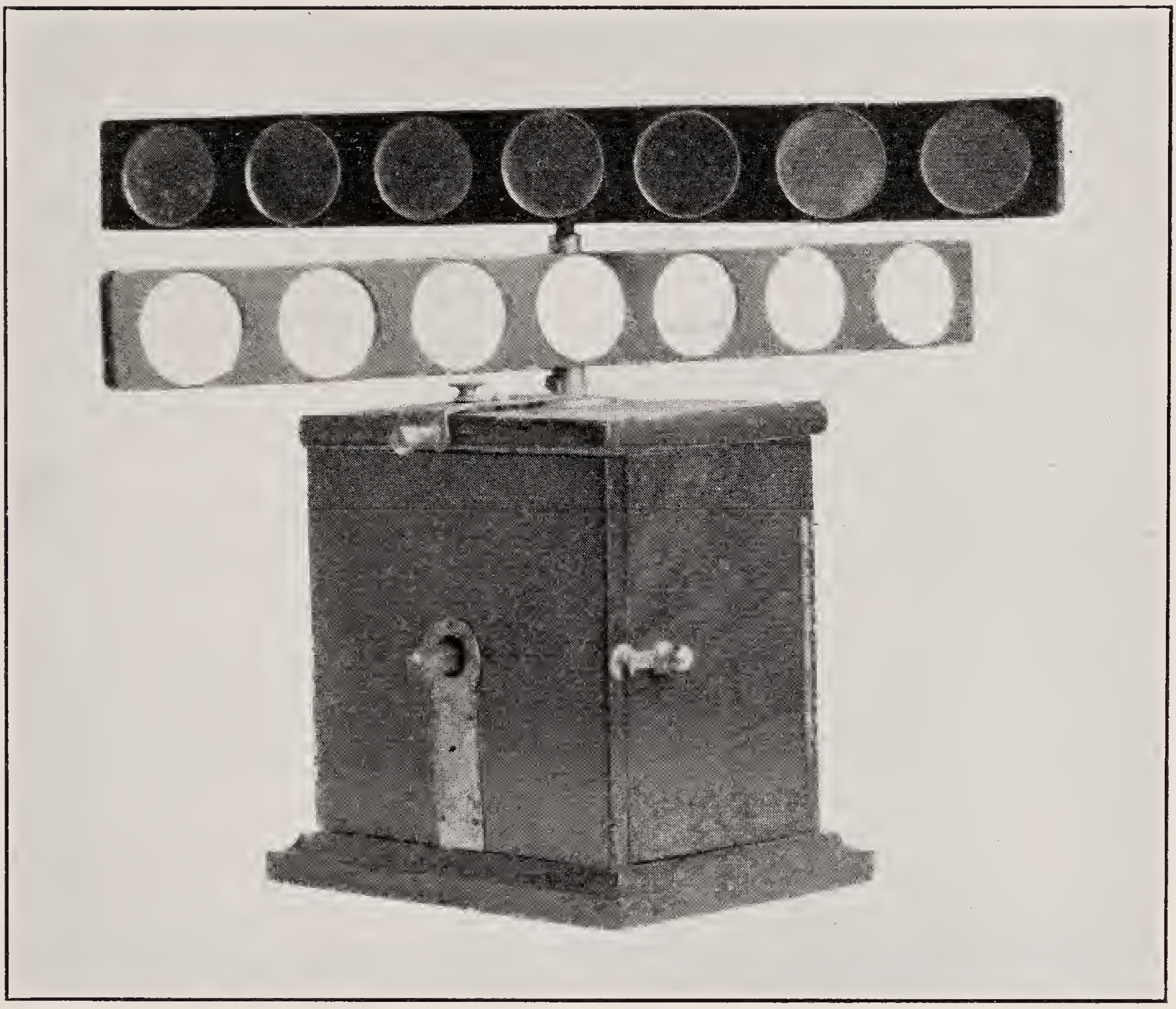


FIG. 12.—MIRROR HYPNOTIZER.

Mirror hypnotizer.—Consists of two wooden arms about 9 inches long, in each of which are set circular mirrors, seven on each side. The two arms are made to revolve in opposite directions by means of clockwork. Some subjects are peculiarly susceptible to the dazzling effect of the revolving mirrors, especially those who have been hynotized before. (See "Man and Abnormal Man," Arthur MacDonald, p. 189.) (Fig. 12.) Cat. No. 143,204, U.S.N.M.

Ball hypnotizer.—A polished nickel-plated ball mounted on a lead wire. The wire is intended for attachment to a headband, and being of lead it may readily be bent to a position a little above the level of the eyes of the subject and slightly within the natural focal distance, so as to produce a certain amount of eyestrain and consequent fatigue of the ocular muscles. The effect of this and other instruments of the kind are usually intensified by "suggestion" on the part of the operator. Cat. No. 143,205, U.S.N.M.

Glass refractor.—One of the means used to induce the condition of hynotism. The subject is directed to gaze fixedly at a facetted piece of glass, or other bright object, held about 8 inches from the eyes, and above the line of horizontal vision. The fixed attention, together with the eyestrain, are sufficient to excite in some persons the peculiar psychic phenomena known as hypnotism or mesmerism. Cat. No. 143,090, U.S.N.M.

EGYPTIAN MEDICINE.

Egyptian medicine is the earliest of which there is a written record, dating as far back as 1550 B. C. In its prehistoric stage, it was doubtless founded on superstition and practiced by magic arts. In its earliest historic period, the sick were taken to the market place "that all who pass by, and have had or seen the like distemper, may give them advice." Later, medicine developed into an orderly system, and at an early historic period, the knowledge of disease and remedies had become quite extensive.

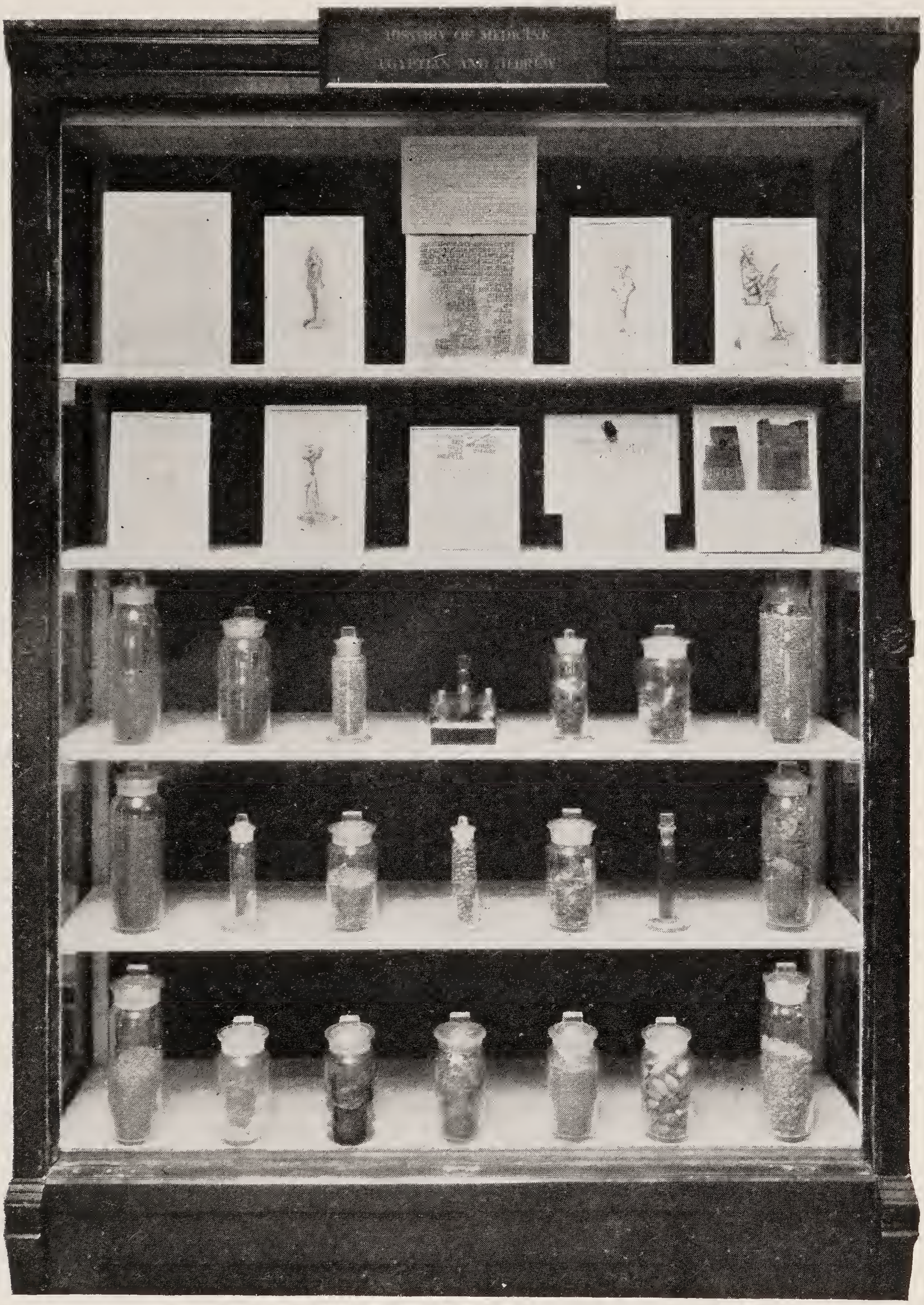
The chief sources of knowledge of Egyptian medicine are the writings of Herodotus (about 480 B. C.), Diodorus Siculus (about 40 B. C.), Galen (130–200 A. D.), and Clement of Alexandria(about 220 A. D.), supplemented by several very ancient papyri, relating to medicine, found in Egyptian tombs.

Like other arts and sciences, medicine was supposed to have originated with the mythological deities of the country, notably Thoth, Osiris, Isis, Horus, and Imhotep. It was practiced in large part by the priesthood of these divinities, and consequently the preparation and administration of remedies were generally accompanied by incantations and invocations, though the practice of the strictly magic arts was severely interdicted. The "Hermetic" medical books, having been given out by the God Thoth, came to be regarded as sacred and any deviation from their rules as sacrilege.

In process of time, the doctors became divided minutely into specialists, until, as Herodotus states:

"The art of medicine is so practiced in Egypt that there is found an individual healer for each individual disease; hence, the whole country is filled with healers."

Many drugs—animal, vegetable, and mineral—were used, of which several hundred are mentioned in existing papyri. Only a few of these can be positively identified. Some of them are of known therapeutic value; others inert; and some are strange and repulsive.



Exhibits of Ancient Egyptian Medicine

For description of plate see page 22

The ancient Egyptians were skilled in pharmacy, which art was said to have been communicated by Horus, to whom it was taught by his mother, Isis. The papyri contains numerous formulæ, many of them complex, in style quite like prescriptions of the present day.

The records give evidence of considerable expertness in operative surgery, such operations as venesection, circumcision, castration, and even lithotomy and amputation being mentioned. As oculists, the Egyptians were noted, and Herodotus states that "Cyrus sent to Amasis (500 B. C.) and had for him an oculist—the best in the whole land of Egypt."

Old Egyptian medicine began to decline, with the first influx of foreigners, during the seventh century B. C., and the beginning of the end came when Amasis (570–526 B. C.) received the Greeks into the country. It entirely vanished before the Greek system, or survived only as a wretched abortion of magic and sorcery.

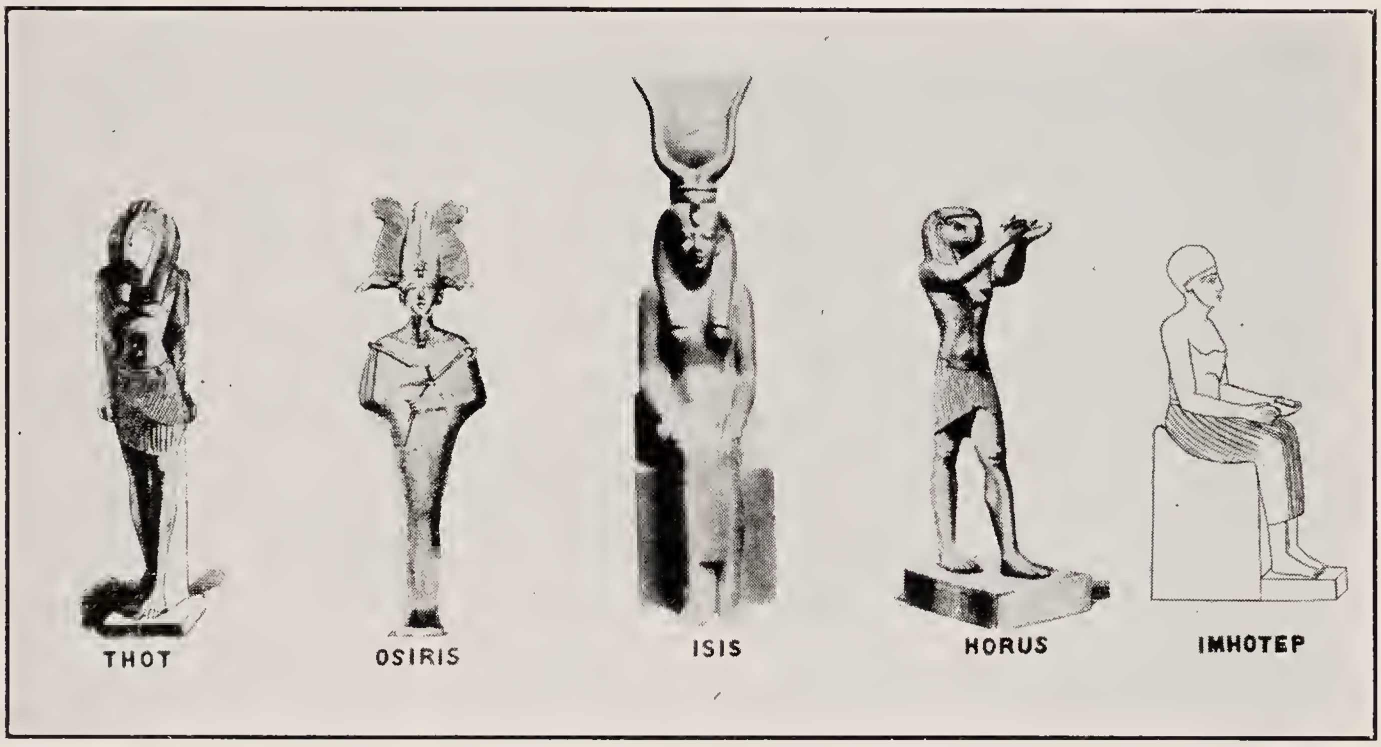


FIG. 13.—THOT, OSIRIS, ISIS, HORUS, IMHOTEP.

Thot (*Thoth. Tot, Althothis*).—The God of Wisdom. Identified by the Greeks and Romans with Hermes and Mercury. All of the arts and sciences emanated from him, including medicine, astronomy, and magic. Through his body flowed the mysterious fluid "Sa," carrying life and health, which he could communicate to human beings. On his wings of an ibis, he was able to bear the souls of the dead over the lake of Rha to the shores of Paradise. He was author of 36 "Hermetic books," of which six pertained to medicine, as follows: 1. Anatomy; 2. General diseases; 3. Surgical instruments; 4. Medicine; 5. Diseases of the eye; 6. Diseases of women. (Fig. 13.) Cat. No. 143,330, U.S.N.M.

Osiris (*Apis, or Serapis*).—An Egyptian god. Osiris and Isis, his wife and sister, are said to have invented the arts which are necessary to life, including agriculture and medicine. (Fig. 13.) Cat. No. 143,333, U.S.N.M.

Isis.—An Egyptian goddess, wife and sister of Osiris and mother of Horus. The chief divinity of the healing art, the goddess of procreation and birth. She invented many medicaments and "was very expert in physick." Being raised to the dignity of goddess, she still takes care of the health of men, and "those who implore her succor find themselves immediately relieved." She was called the Lady of Enchantments, having originated many of the charms and invocations used in the Egyptian practice of medicine. (See fig. 13.) Cat. No. 143,331, U.S.N.M.

Horus.—Son of Osiris and Isis. One of the founders of the art of medicine. Having been put to death by Set, he was restored to life by his mother, Isis, who later revealed to him the secrets of pharmacy. He was called the God of Divination, which he also learned of his mother. He is represented with the head of a hawk. (See fig. 13.) Cat. No. 143,334, U.S.N.M.

Imhotep; I-em-hotep.—A learned physician, probably a priest of Ra, the sun god. He lived during the third dynasty, about 3,500 years B. C. In the course of ages he was deified as the special God of Medicine. His name I-em-hotep, is translated "He who cometh in peace," and he is described as the good physician of gods and men, kind and merciful, assuaging the sufferings of those in pain, healing the diseases of men, and giving peaceful sleep to the restless. His great temple stood outside the eastern wall of Memphis, near the Serapeum. (See fig. 13.) Cat. No. 143,332,U.S.N.M.

Papyrus Ebers.—The Papyrus Ebers is a treatise on materia medica, pharmacy, and therapeutics, one of the oldest known medical works; written 1,552 years before the Christian era, in the time of Moses, and before the exodus of the Israelites from Egypt. It was found near the necropolis of Thebes, in Upper Egypt, in 1872.

Written in Hieratic characters upon a kind of paper prepared from the papyrus plant, in a sheet 12 inches wide and 100 feet long closely rolled into a scroll.

It contains references to many drugs, animal, vegetable, and mineral, and gives numerous formulæ for the compounding of medicine and the therapeutical indications for their use.

Among the animals mentioned are: The buffalo, stag, ox, pig, camel, ram, dog, crocodile, bat, goose, tortoise, beetles, and flies.

Among the plants: Acacia, sweet flag, wormwood, myrrh, frankincense, coriander, saffron, cumin, citron, henbane, juniper, lettuce, flax, mandrake, olive, pomegranate, castor-oil plant, willow, sesamum, and fenugreek.

Among the minerals: Sea salt, niter, charcoal, lead, bronze, antimony, copper, lapis lazuli, and sapphire.

Miscellaneous remedies: Blood, human brains, urine, feces, genitals of cats, various oils, stale beer, honey, wine, milk, yeast, eggs, and wax.

Therapeutics: Mention is made of purgatives, anthelmintics, tonics, antilithics, abortives; remedies for diseases of the stomach and heart, for fistula, hemorrhoids, strangury, hemicrania, diarrhea, conjunctivitis, cataract, inflamed eyes, granular lids, baldness, cancer, gangrene, boils, toothache, erysipelas, eruptive diseases, various diseases of women; as well as instructions for bandaging wounds, the operation for stone, foetal extraction, removal of tumors, etc. In all showing careful observation of diseases and intelligent application of remedies.

The work also contains proof that the ancient Egyptians were tolerably well versed in superficial anatomy for nearly all parts of the human frame are mentioned as well as the larger viscera. (See fig. 14.) Cat. No. 143,511, U.S.N.M.

Prescription from the Papyrus Ebers.—Written about 1552 B. C., in the hieratic (script) writing of that period, with translations into hieroglyphic Egyptian, phonetic English, and literal English. (See fig. 15.) Cat. No. 143,335, U.S.N.M.

Egyptian medicine chest and stone case.—Picture of a medicine chest of the wife of Pharaoh Mento-hotep, of the XI dynasty, 2500 B. C., and the stone case in which it was found in the queen's tomb. The chest contained six vases, one of alabaster and five of serpentine, with dried remnants of drugs, two spoons, a piece of linen cloth, and some roots, inclosed in a basket of straw work. (See fig. 16.) Cat. No. 143,512, U.S.N.M.

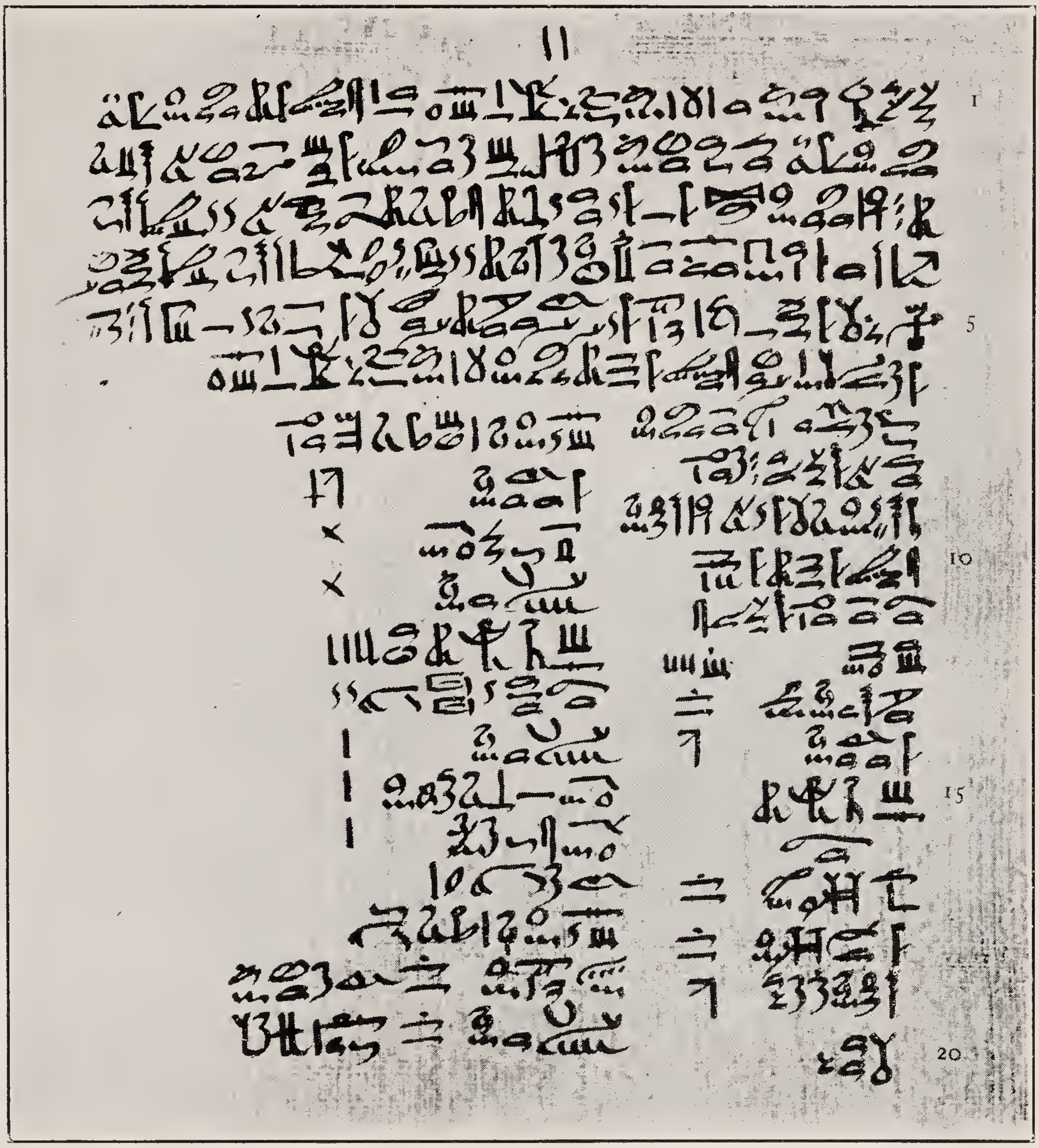


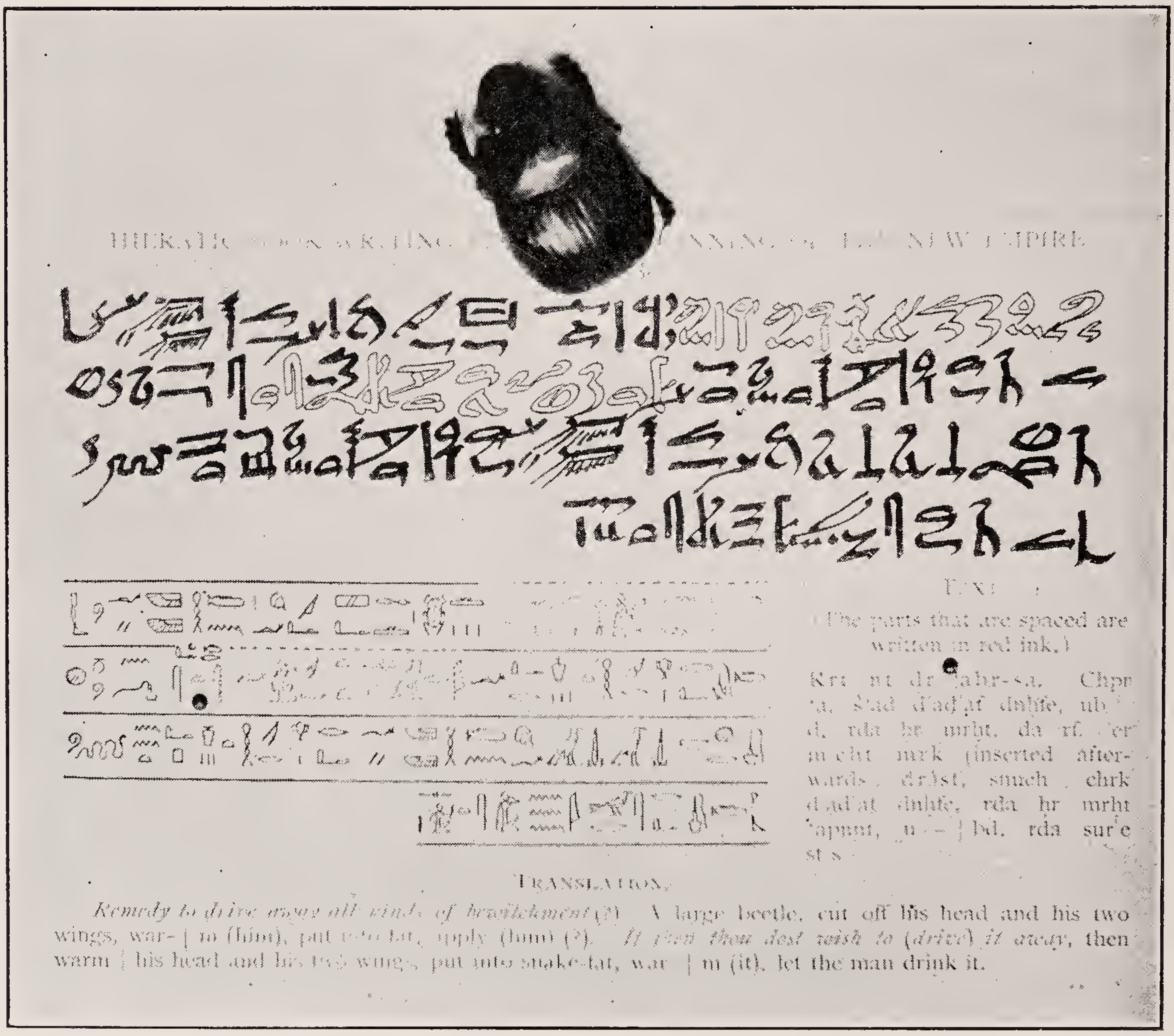
Fig. 14.—A Photographic Copy of a Section of the Papyrus Ebers, Reduced in Size, Taken from a Facsimile, in Colors, of the Original.

Some medicinal materials of the ancient Egyptians.—The Papyrus Ebers was supposed by its discoverer to have been compiled about the time when Moses was living in Egypt, a century before the Exodus. While the Jews were captives in Egypt it is reasonable to suspect similarity in their materia medica and that of the Egyptians of about the same period. This similarity is evident, passages from the Old Testament of the Bible referring to many of the medicinal substances mentioned in the Papyrus Ebers.

A few of these ancient drugs which are well known, and used up to the present time, are included in the historical collection.

Mastich.—A resinous exudation from *Pistacia lentiscus*, a shrub or small tree growing on the shores and islands of the Mediterranean. It was one of the ingredients of "kyphi" much used by the Egyptians for fumigations. Cat. No. 49,963, U.S.N.M.

Saffron.—The stigmas of *Crocus sativus*. Saffron is a very ancient drug mentioned by Solomon, Homer, Hippocrates, and Virgil. It was an article of traffic on the Red Sea in the first century. It entered into the composition of all sorts of medicine, external and internal, and was used as a condiment and perfume. Severest penalties, even death, were inflicted on those guilty of its sophistication. Its use in modern medicine is as a coloring agent only. Cat. No. 50,222, U.S.N.M.



(The parts that are spaced are written in red ink.)

TRANSLATION.

Remedy to drive away all kinds of bewitchment (?). A large beetle, cut off his head and his two wings, war- | m (him), put into fat, apply (him) (?). *If then thou dost wish to (drive) it away*, then warm | his head and his two wings, put into snake-fat, war- | m (it), let the man drink it.

Fig. 15.—Prescription from the Papyrus Ebers.

Fenugreek.—Seeds. Believed to have been an ingredient of the Egyptian preparation kyphi. It is still among the official drugs of some of the European pharmacopoeias. Cat. No. 50,248, U.S.N.M.

Squill.—The bulb of *Urginea maritima.*—Called by the Egyptians the "Eye of Typhon." A highly esteemed remedy for dropsy. Cat. No. 50,259, U.S.N.M.

Galbanum.—A gum resin obtained from *Ferula galbaniflua* Boisson and Buhse, a plant growing in Persia and India. It was an ingredient of the incense used in the form of worship of the ancient Israelites; is mentioned by the earliest Greek medical writers; was well known to the Arabians under the name of "kinnah," and is still recognized by many of the European pharmacopoeias. Cat. No. 50,533, U.S.N.M.

Flaxseed.—The seed of *Linum usitatissimum*, common flax. The seed was used for food by the Egyptians, Greeks, Romans, and other ancient peoples. Cat. No. 51,380, U.S.N.M.

Sesame.—The seeds of *Sesamum indicum*, native of India, cultivated in all warm countries. The Egyptian name, "Semsent," occurs in the Papyrus Ebers, from which name is derived the Coptic "Semsem," the Arabic "Simsim," and the modern "Sesamum." Largely consumed as food; the oil is used for the same purposes as olive oil. The leaves are mucilaginous. Cat. No. 52,162, U.S.N.M.

Lign-aloes.—The fragrant resinous wood of the eagle tree of India, *Aquilaria agallocha.* Used as incense, and in embalming the dead. "All thy garments smell of myrrh, and aloes and cassia." Psalms, xlv, 8. "How goodly are thy tents, O Jacob, and thy tabernacles, O Israel. As the valleys are they spread forth, * * * as the trees of lign-aloes which the Lord hath planted * * *." Numbers, xxiv, 5–6. Cat. No. 52,173, U.S.N.M.

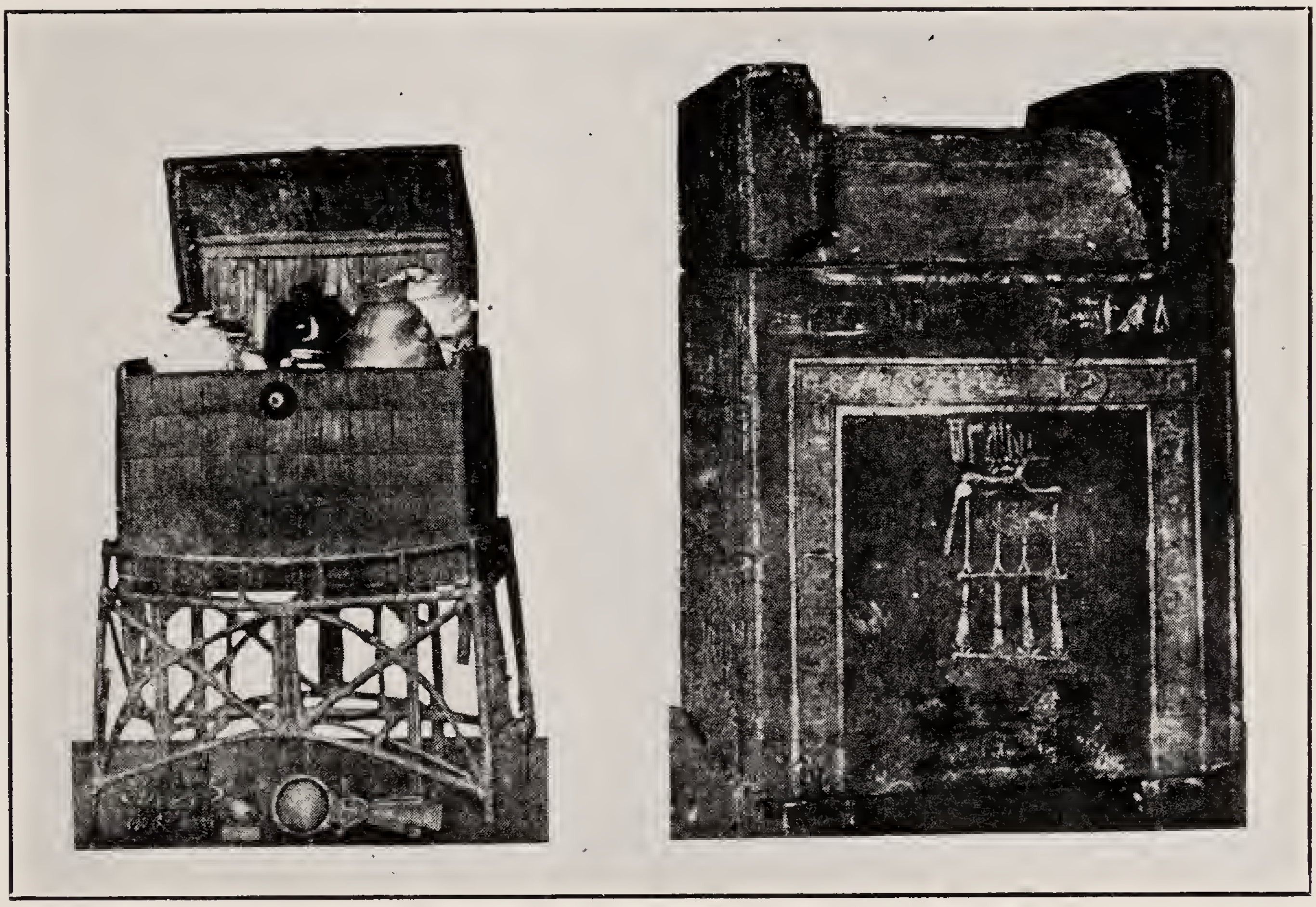


FIG. 16.—EGYPTIAN MEDICINE CHEST AND STONE CASE.

Castor-oil seeds.—The seeds of *Ricinus communis*, native of India, early cultivated in Egypt. The seeds have been found in ancient Egyptian tombs. The plant is believed by some to be the same mentioned in the book of Jonah, iv, 6, under the name of "gourd." The plant was introduced from Egypt into Greece where the oil of the seeds was used extensively in medicine, as well as for burning in lamps. Cat. No. 52,177, U.S.N.M.

Barley.—The seeds of *Hordeum hexastichon*, indigenous to western Asia; cultivated everywhere. It is mentioned in the Bible as a cultivated grain in Egypt and Syria. Cat. No. 52,393, U.S.N.M.

Cyperus.—The root of various species of *Cyperus*. Used by the Egyptians for snake bites and for the retention of urine; bruised or mixed with wine or vinegar it was applied as a poultice. Cat. No. 52,521, U.S.N.M.

Pomegranate.—The rind of the fruit of *Punica granatum*, a low tree grown in India, Palestine, and neighboring countries. There are many representations of the fruit on the ancient monuments of Egypt, and it is frequently referred to in the Scriptures. The pulp of the fruit is edible; the peel is an efficient astringent. Cat. No. 52,535, U.S.N.M.

Frankincense.—A fragrant gum resin obtained from various species of *Boswellia* trees, natives of eastern Africa and southern Arabia. Paintings, dating from the seventeenth century B. C., illustrating the traffic in this drug, have been found in the temples of Upper Egypt. It was one of the gifts of the Magi to the infant Saviour. It was, and still is, an essential ingredient of "incense" as used in religious ceremonies. Fumigation with fragrant drugs, of which frankincense was one of the most important, was one of the principal remedial and preventive measures in the treatment of disease by the ancient Egyptians and Hebrews. Cat. No. 52,559, U.S.N.M.

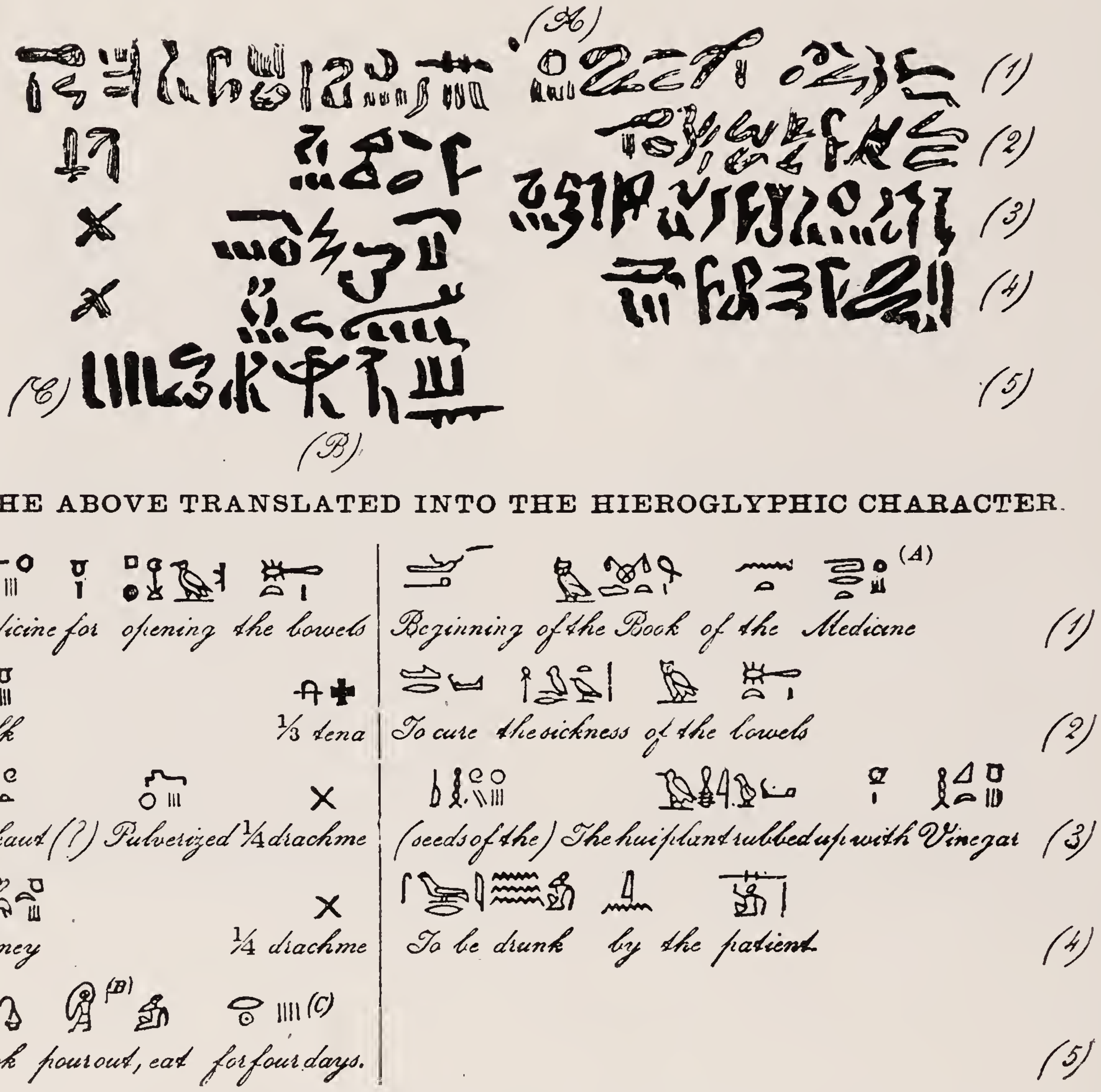

(A)
(1)
(2)
(3)
(4)
(5)
(C)
(B)
THE ABOVE TRANSLATED INTO THE HIEROGLYPHIC CHARACTER.
(A)
Medicine for opening the bowels
Beginning of the Book of the Medicine
(1)
Milk
⅓ tena
To cure the sickness of the bowels
(2)
Nekaut (?) Pulverized ¼ drachme
(seeds of the) The hui plant rubbed up with Vinegar
(3)
Honey
¼ drachme
To be drunk by the patient
(4)
(B)
(C)
Cook pour out, eat for four days.
(5)

FIG. 17.—FIVE LINES FROM THE PAPYRUS EBERS, WITH TRANSLATIONS INTO HIEROGLYPHIC CHARACTERS AND INTO ENGLISH.

Coriander.—The fruit of *Coriandrum sativum.* The knowledge of this drug is of very great antiquity, being mentioned in the Papyrus Ebers, and by the early Sanskrit writers, as well as in the Bible. It was used both as a condiment and a medicine. Cat. No. 52,659, U.S.N.M.

Medicine vials.—Made by the inhabitants of Palestine. Used for dispensing medicines. (Fig. 18.) Cat. No. 143,168, U.S.N.M.

Gum arabic.—A gummy exudation from various species of *Acacia.* It is recorded that this drug was an article of Egyptian commerce as early as the seventeenth century, B. C. Cat. No. 52,811, U.S.N.M.

Balm of Gilead.—An aromatic resin which flows from the trunk of *Commiphora opobalsamum.* Used for its perfume as well as its healing virtues.

"Is there no balm in Gilead; is there no physician there? Why then is not the health of my people recovered?" Jeremiah viii, 22. Cat. No. 53,380, U.S.N.M.

Myrrh.—A gum resin. This was one of the many constituents of the celebrated kyphi of the Egyptians, used in fumigations, medicine, and the process of embalming. It was an ingredient of the "holy oil" of the Jewish ceremonial as directed by Moses. It is also mentioned in the Bible among the articles used in the purification of women, as an emblem of purity, as a perfume, and one of the substances used in embalming. Cat. No. 141,681, U.S.N.M.

Cumin.—The fruit of *Cuminum cyminum*, indigenous to the region of the upper Nile, early cultivated throughout the east. It is well known to the ancients and is mentioned in both the Old and the New Testament. It was one of the most commonly used spices during the Middle Ages and is found in the drug markets of the present time. Cat. No. 142,259, U.S.N.M.

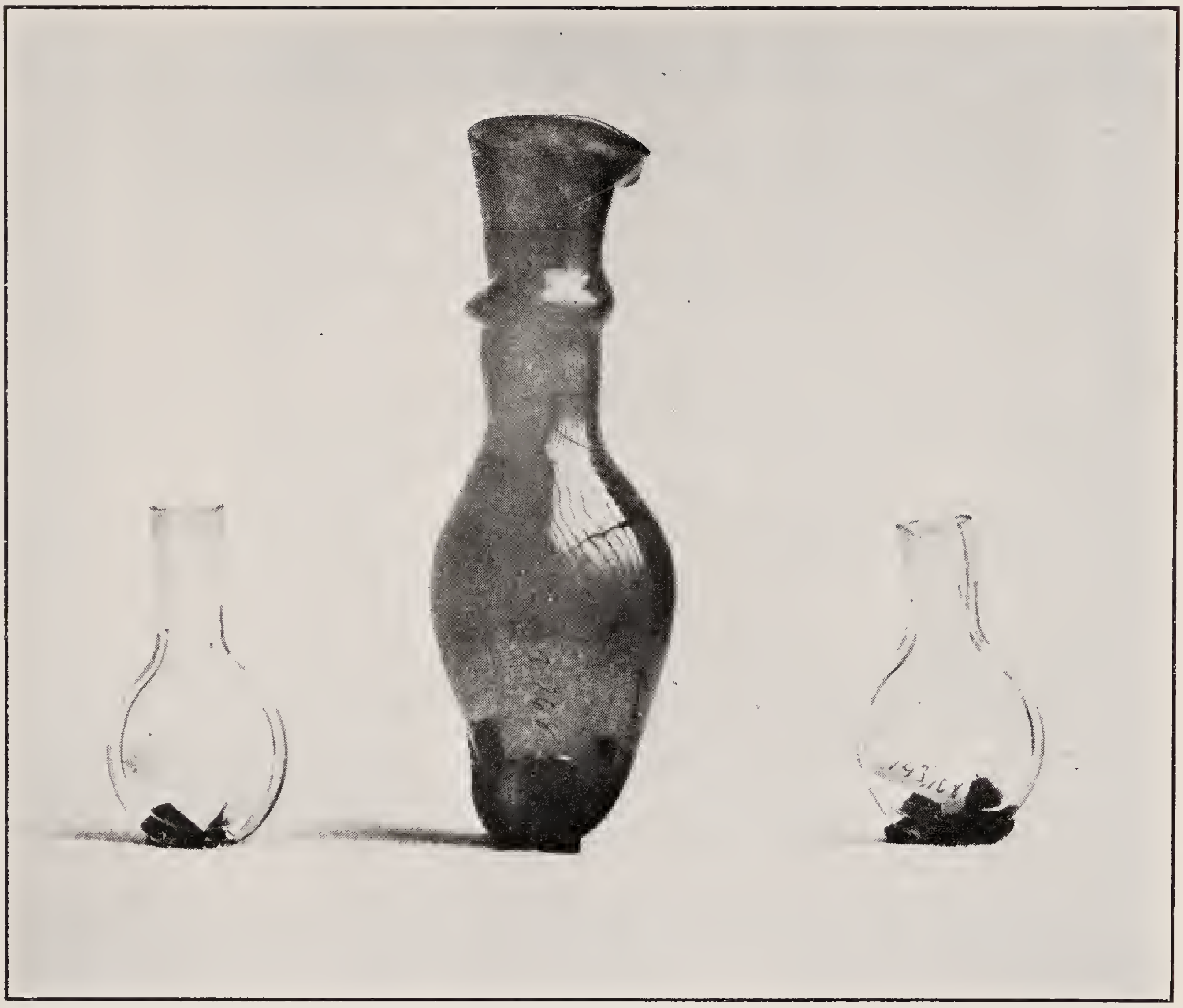


FIG. 18.—MEDICINE VIALS.

Almonds.—The seeds of the almond tree, *Prunus amygdalus*, native of western Asia, early introduced and cultivated in northern Africa and southern Europe. Mentioned in the Book of Genesis (xliii, 11) where it is stated that the patriarch Israel commanded his sons to carry with them into Egypt a present consisting of the productions of Palestine, one of which was almonds. Cat. No. 143,197, U.S.N.M.

Figs.—The fruit of *Ficus carica*, native of western Asia, extensively cultivated. The fig tree is the first plant mentioned by name in the Bible (Genesis iii, 7). The fruit was an important article of food for the Hebrews and was also used medicinally. "For Isaiah had said, let them take a lump of figs and lay it for a plaister upon the boil, and he shall recover." Isaiah xxxviii, 21. Cat. No. 143,198, U.S.N.M.

GREEK AND ROMAN MEDICINE

The primitive period of Greek medicine is mostly mythical. It begins with Melampus (about 1,400 years B. C.) and ends with Hippocrates (460 B. C.). The most prominent character during this period was Aesculapius, reputed son of Apollo and Coronis. As the god of medicine he was worshipped by Greeks and Romans everywhere. Temples were erected in his honor and served by a priesthood of his descendants, called Asclepiadae. The sick were brought to these temples, prayers and sacrifices offered, and treatment prescribed as indicated by dreams or signs given in answer to the prayers and sacrifices. Records of the cases, symptoms, treatment, and results were carved upon votive tablets and hung upon the walls of the temple.

The philosophic period began with Hippocrates (born 460 B. C.), believed to be the seventeenth in descent from Aesculapius. He is styled " The Father of Medicine," and it is justly said of him that " the medical art as we now practice it, the character of the physician as we now understand it, both date for us from Hippocrates." He separated medicine from priestcraft; taught that disease was a process governed by natural laws, and that the clew to proper treatment was to be found in minute observations of its symptoms and natural course. Surgery had already made much progress. Among the surgical operations recorded are reduction of dislocations and fractures, resection of bones, trephining, opening of abscesses of kidneys and liver, operation for fistula and hemorrhoids, operations on club feet, and sounding the bladder for stone.

After Hippocrates came many celebrated Greek physicians noted as authors and founders of various " schools " of theoretical medicine, such as " humoralist," " solidist," " vitalist," " empiricist," etc. The most eminent of these later Greek physicians, and one whose influence was most widespread and continuous, was Galen (born 130 A. D.). He was a brilliant orator and voluminous writer, and the tendency of his teachings was to harmonize the conflicting doctrines of the several schools and to develop the more simple teachings and methods of Hippocrates. His works were authoritative down to a comparatively recent period.

Dioscorides (born about 77 A. D.) was the most renowned writer on materia medica. He makes mention of about 90 minerals, 700 plants, and 198 animal substances.

Rome neither originated nor possessed an independent school of medicine. Early Roman medicine was founded on superstition and practiced by magic arts. Later it was controlled by Greek physicians. though as a branch of philosophy it was expounded by Roman teachers and writers.

Exhibits of Greek and Roman Medicine

For description of plate see page 30

Aesculapius.—The Greek God of Medicine, son of Apollo and the nymph Coronis. His mother was slain by his father, and Aesculapius was given to the centaur, Chiron, to be reared and educated. Under Chiron's instruction Aesculapius became marvellously skilled in medicine, not only healing the sick, but raising the dead. On the complaint of Pluto that Aesculapius was desolating the realms of the shades, Jupiter slew him with his thunderbolt, but at the request of Apollo he was placed among the stars. He was worshipped as a god, and numerous temples were erected for his services, conducted by priests called Asclepiadae. (See fig. 21.) Cat. No. 143,513, U.S.N.M.

Chiron.—From an engraving of a wall painting in Pompeii. The most celebrated of the centaurs, son of Saturn and the nymph, Philyra. The legend is that Saturn dreading the jealousy of his wife, Rhea, transformed Philyra into a mare and himself into a steed; the offspring was Chiron, half man and half horse. Having been instructed in hunting, gymnastics, music, and medicine, he became the instructor of others in these arts and accomplishments, especially Aesculapius and Achilles in medicine (fig. 19). Cat. No. 143,515, U.S.N.M.

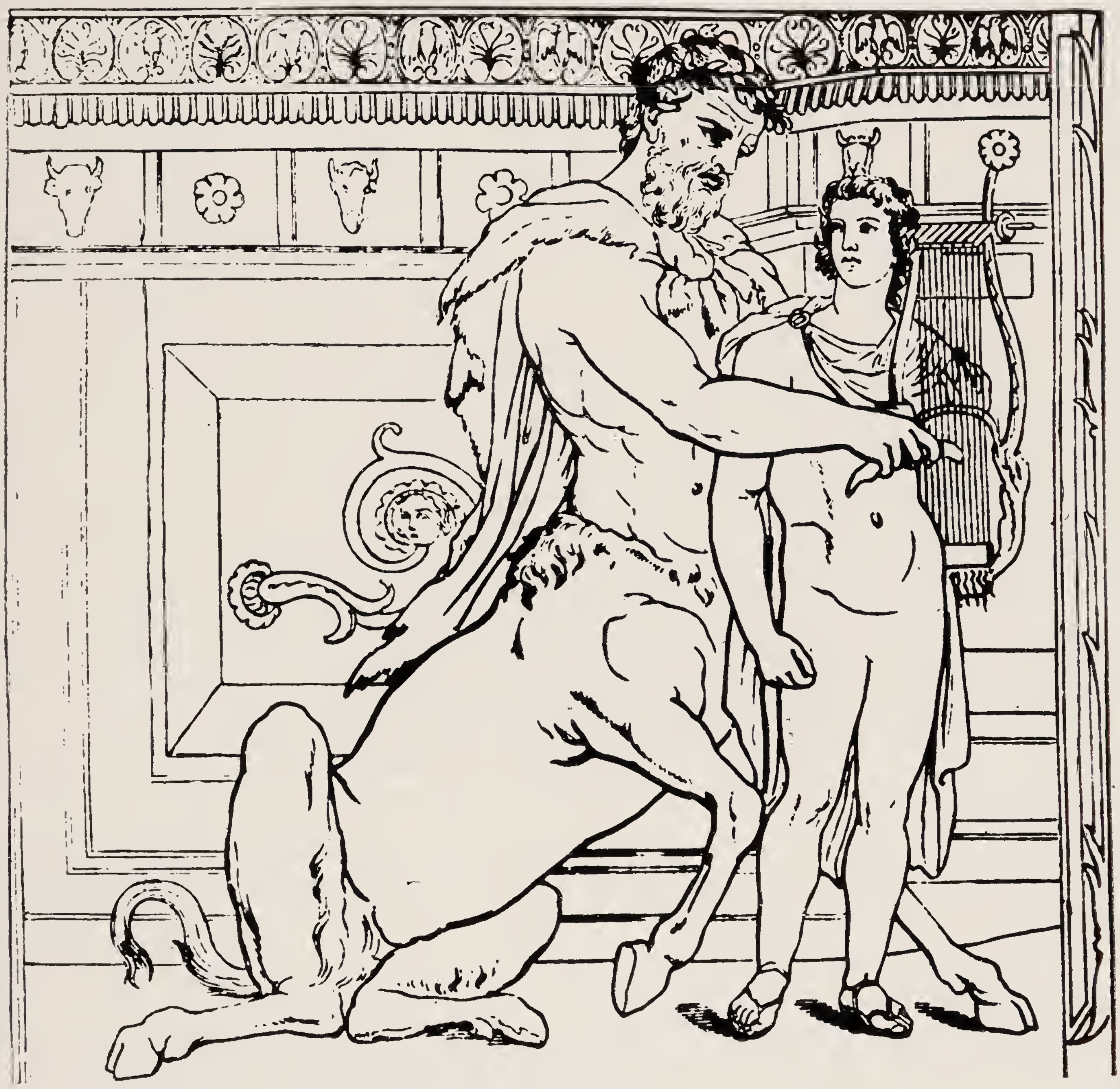


FIG. 19.—CHIRON.

Machaon.—Machaon and his brother Podalirius, sons of Aesculapius, were next to their father, the most noted physicians in the legendary Greek period. They were equally celebrated as warriors, and made themselves so conspicuous by their valor that Homer ranks them among the first of the Greek heroes. They commanded a division of the Greek fleet in the Trojan War, being the first doctor admirals on record. Machaon was one of the heroes of the wooden horse, and is supposed to have lost his life on that occasion. After his death he received divine honors, and a temple was erected in his honor. (See pl. 5.) Cat. No. 143,516, U.S.N.M.

The Hieron or sacred place at Epidaurus.—This enclosure contained, besides the temple for the worship of Aesculapius, a propylea or gateway, a gymnasium. the abaton or sleeping place for the pilgrims, the tholos, a circular building of which the uses are unknown, a stadium or race course, and several other buildings of doubtful utility. These sacred places were usually located on wooded slopes, or about medicinal springs. Within them no dying person nor parturient woman was allowed to remain. The temples erected to Aesculapius were not only places for worship by prayers, sacrifices, etc., but also places where the sick could make personal application to the divine physician for counsel or cure. The ceremonies were under the direction of a priesthood called Asclepiads, supposed descendants of Aesculapius. The treatment of the sick was almost exclusively psychic, or mind medicine. It was begun with ablutions, prolonged fastings, prayers, and sacrifices, accompanied with elaborate ceremonials calculated to excite the imagination and inspire hope. After these preparations the patient was put to sleep in the "abaton," and in the dreams which followed the god was supposed to appear and indicate the proper remedy for the disease. The patient was aided in the interpretation of the dream by the priest. If the treatment was successful the case was recorded upon stone or metal columns or tablets, for the information of others. Metal or ivory models of the part affected were hung on the walls of the temple, as is the custom in many countries at the present day. (See fig. 20 and pl. 5.) Cat. Nos. 143,517 and 143,518 U.S.N.M.

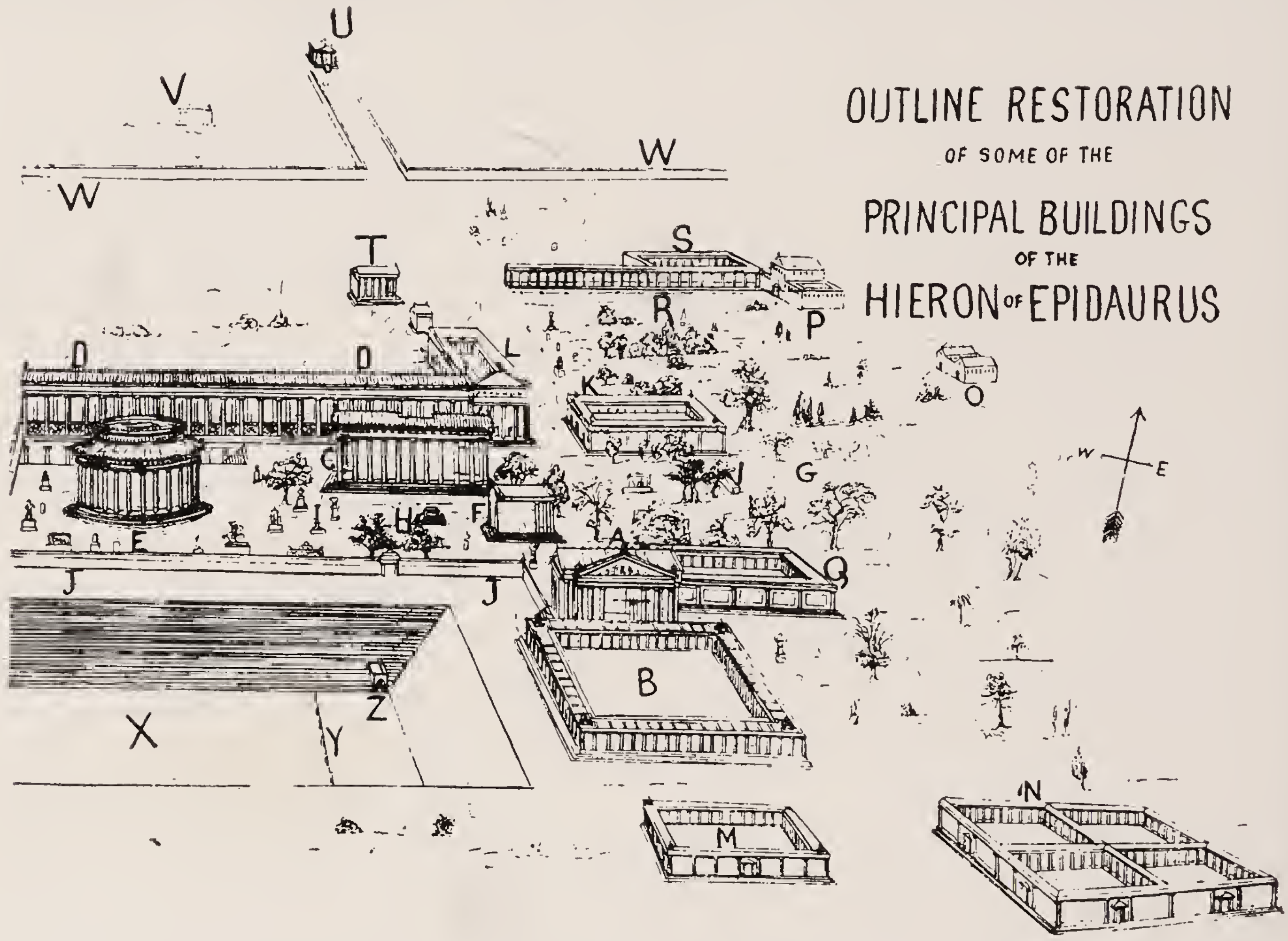


Fig. 20.—The Hieron or Sacred Place at Epidaurus. Outline Restoration.

Statue of Aesculapius.—The statue of Aesculapius shown in Figure 21 was made of ivory and gold, by the sculptor Thrasymedes. It represents a handsome figure seated on a throne, holding in one hand a staff, the other hand resting upon a serpent, and lying by his side, a dog. The serpent and the dog are satellites of Aesculapius, and living specimens of these animals were kept in the temples, and sometimes played a part in the miraculous cures. The serpent, son of the earth, living in the bosom of the earth, symbolizes secret and mysterious powers. Its habit of shedding its skin every year makes it a symbol of rejuvenation. The Romans, during a pestilence (B. C. 293), sent a solemn embassy to Epidaurus to obtain the sacred serpent kept in that temple, hoping thereby to stay the plague.

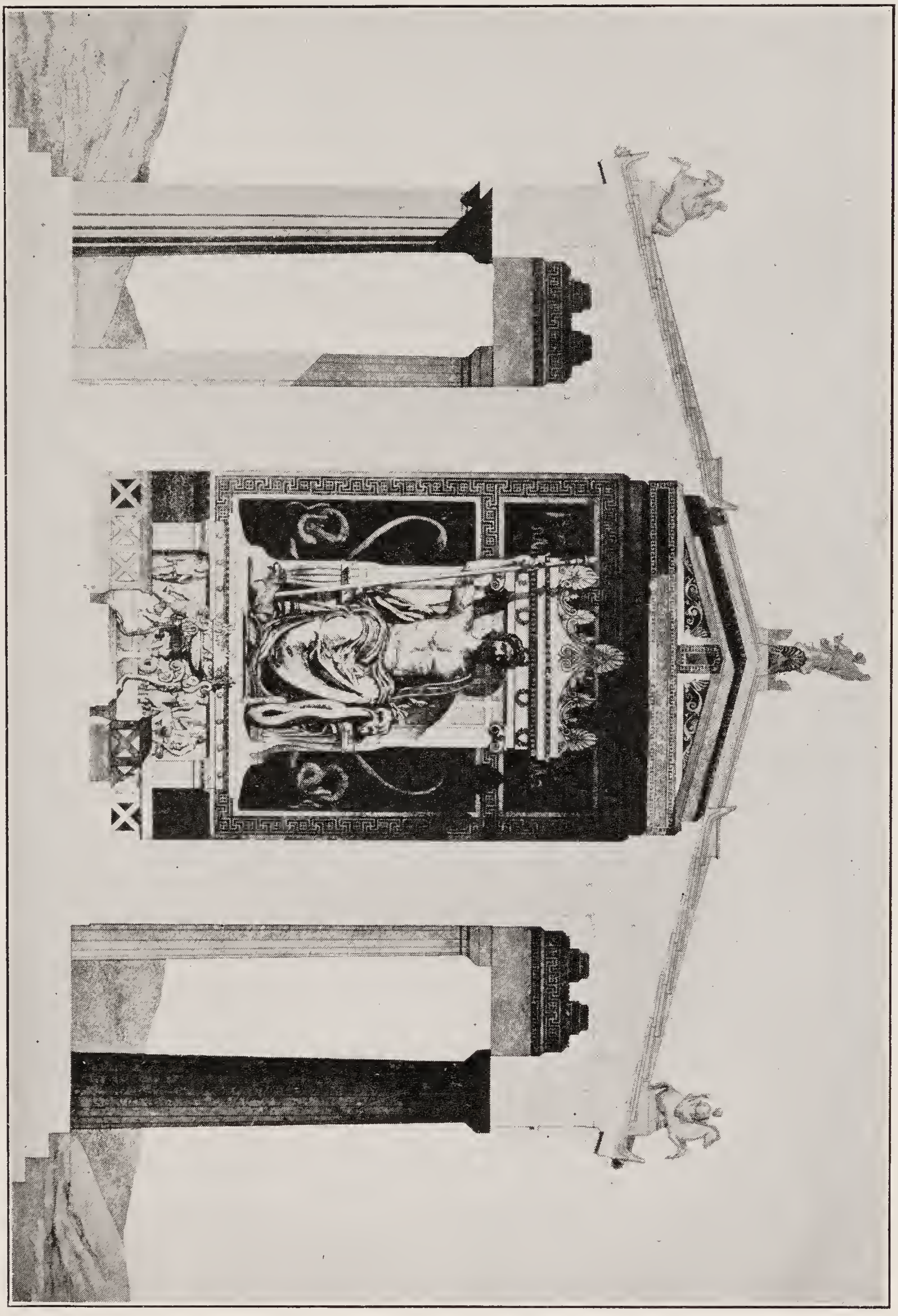
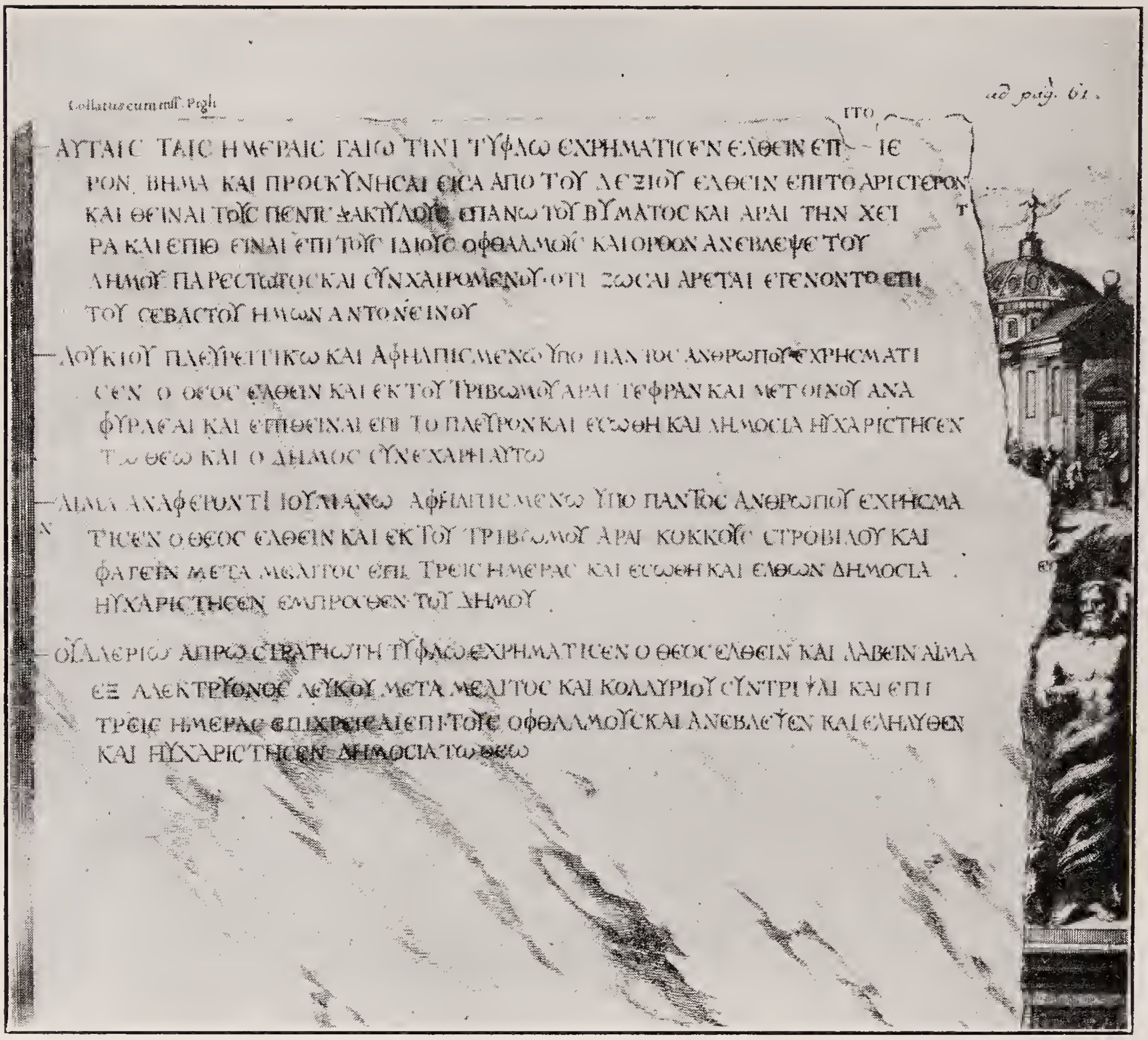


FIG. 21.—THE TEMPLE OF AESCULAPIUS AT EPIDAURUS. TRANSVERSE SECTION SHOWING THE STATUE OF AESCULAPIUS.

Copy of memorial tablet.—It was the custom, in the early Greek period, to commemorate notable cures by a record of the cases engraved upon tablets of metal or marble. The tablet represented in Figure 22 bears the record of four cases, two of blindness, one of hemorrhage from the lungs, and one of pleurisy. It illustrates the fact that the medical practice in the Greek temples was purely psychic, or mind medicine, a method as old as history. Translated into English the records on the memorial tablet read as follows:

(1) Lately a certain Gaius, who was blind, learned from the oracle that he should approach the altar, offering prayers, then cross the temple from right to left, place his five fingers upon the altar, raise his hand and place it upon his eyes. He recovered his sight at once, in the presence and amid the applause of the people. This evidence of the omnipotence of the god was manifested during the reign of Antoninus (about 120 A. D.).


Collatus cum mss. Pighi

ad pag. 61.

ΙΤΟ

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ΚΑΙ ΗΥΧΑΡΙCΤΗCΕΝ ΔΗΜΟCΙΑ ΤΩ ΘΕΩ

FIG. 22.—COPY OF A MEMORIAL TABLET FOUND ON THE SITE OF A TEMPLE OF AESCULAPIUS ON THE ISLAND OF THE TIBER AT ROME.

(2) A blind soldier named Valerius Aper, having consulted the oracle was directed to mix the blood of a white cock with honey, and make of it an ointment which he was to rub on the eyes for three days. He recovered his sight and went to thank the god before all the people.

(3) A certain Julian was given over by all because of a spitting of blood. The oracle directed him to go to the altar, thence take some pine nuts, mix them with honey, and eat of them for three days. He was saved, and returned to give thanks to this god, in the presence of all the people.

(4) The son of Lucius was attacked with a pleurisy and his life was despaired of. The god, who appeared to him in a dream, ordered him to take ashes from the altar, mix them with wine, and apply to his side. He was saved, and came to thank the god before all the people, who wished him all kinds of prosperity. (See Hundertmarck, "De Incrementis Artis Medicae.") Cat. No. 143,519, U.S.N.M.

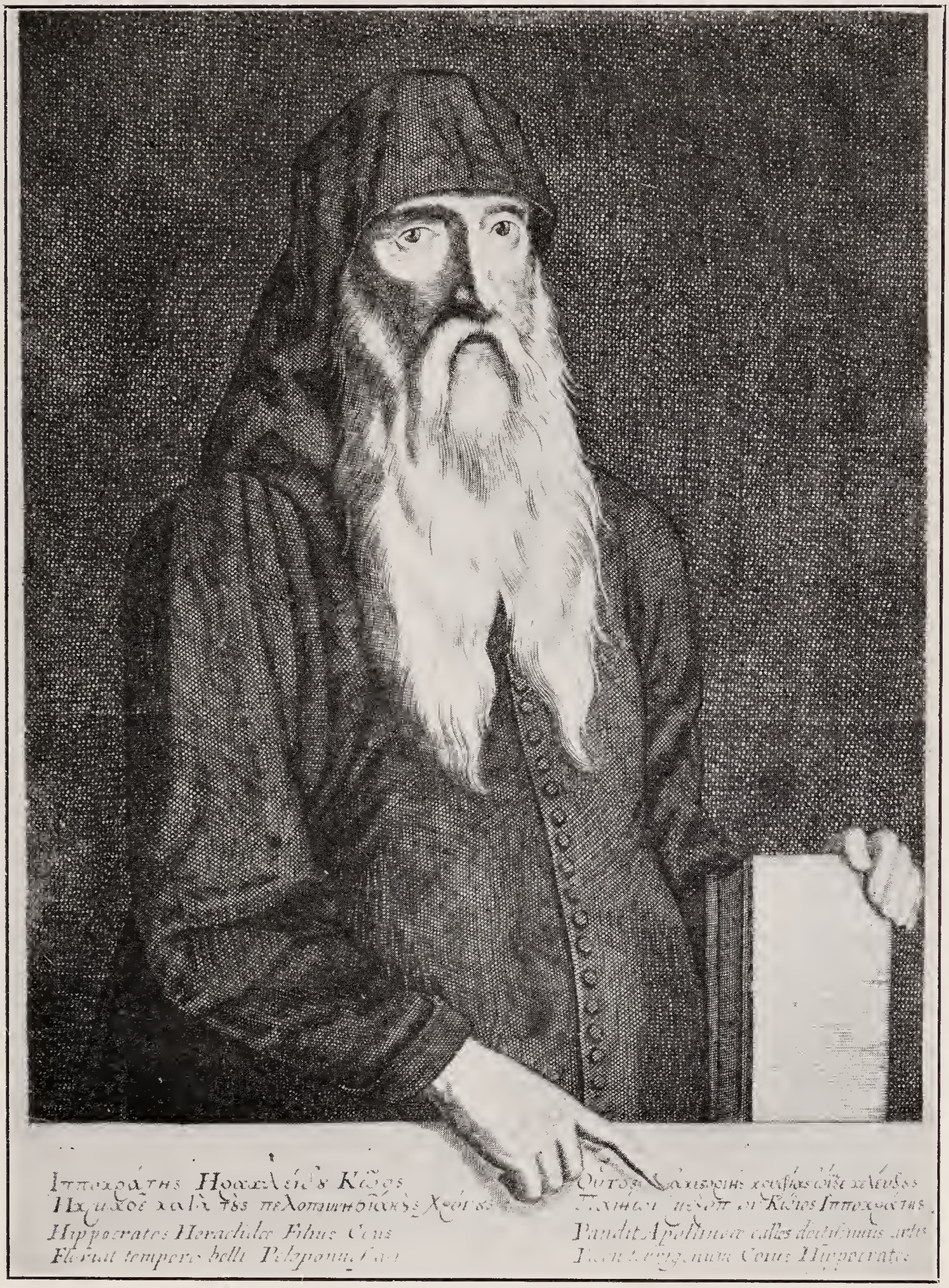
Hippocrates Heraclidæ Filius Cous
Floruit tempore belli Peloponnesiaci
Pandit Apollineæ calles doctissimus artis
Cous Hippocrates

FIG. 23.—HIPPOCRATES.

Hippocrates.—Called the "Father of Medicine." Born on the Island of Cos in the year 460 B. C. He belonged to the family of the Asclepiadae, a gild of priest-physicians reputed to be descendants of Aesculapius, from whom he was believed to be the seventeenth in lineal descent. Before his time medicine was almost exclusively theurgic, or magical. Hippocrates was the first to separate medicine from superstition and priestcraft, to base its practice upon the principles of inductive philosophy, and direct especial attention to the natural history of disease. He laid great stress upon regimen, and was the first to enunciate the principles of public health. He wrote voluminously upon various subjects relating to medicine, and his works have been reproduced in many languages and editions. (Fig. 23.) Cat. No. 143,520, U.S.N.M.

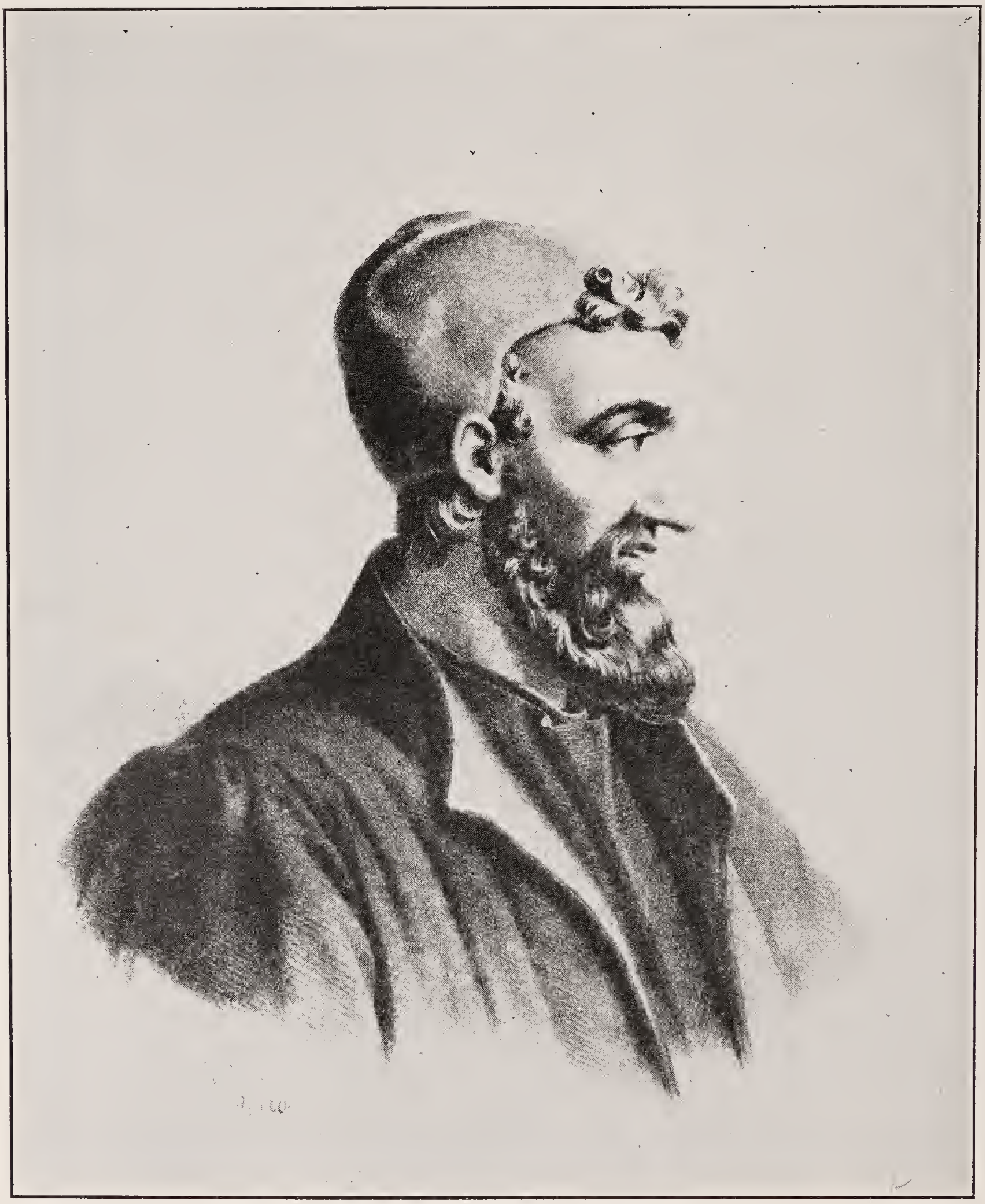

FIG. 24.—CLAUDIUS GALEN.

Hippocratic oath.—A form of oath said to have originated with Hippocrates, and to have been required of all his pupils. Possibly it antedates his time, as it is believed by some historians to have been administered to the pupils of the schools of the Asclepiadae. Whatever its origin it stands as a remarkable testimonial to the high standard set for the physician of that early period.

Certainly from the time of Hippocrates (460 B. C.) to the present it has been administered or read to the graduates of medical schools, as a classical expression of the high moral principles which should govern the physician in his personal conduct, and in his relations toward his patients.

"I swear by Apollo, physician, by Aesculapius, by Hygeia and Panacea, by all the gods and all the goddesses—taking them to witness—that I will fulfill with my strength and my capacity this oath and engagement: I will place my master in medicine in the same rank with the authors of my life; I will share with him my fortune, and in necessity I will provide for his wants; I will regard his sons as brothers, and if they desire to learn medicine, I will teach them without pay. I will communicate my precepts, my oral lessons, and all other instruction to my sons, to the sons of my master, and to those disciples who are bound by an engagement and an oath according to the medical law, but to no others. I will direct the regimen of my patients for their advantage, to the best of my ability and judgment. I will abstain from all wrong and injustice. I will not furnish poison to anyone who solicits it, neither will I make a suggestion of it to any one; neither will I furnish to any woman an abortive. I will pass my life, and I will exercise my art, in innocency and purity. I will not perform the operation of lithotomy, but will leave it to those who occupy themselves therewith. Into whatsoever house I enter, it shall be for the good of my patients, keeping myself from all corrupting conduct, and especially from the seduction of women and boys, free or slaves. Whatever I see or hear in society, in the exercise, or even not in the exercise, of my profession, I will keep secret, if it is not necessary to divulge it, regarding discretion as a duty in all such cases. If I fulfill this oath, without violation, may it be given me to enjoy happily life and my profession, honored forever among men; if I violate it and perjure myself, let the opposite fate be my lot." Cat. No. 143,521, U.S.N.M.

Glaudius Galen.—Next to Hippocrates, the most illustrious of the ancient physicians. Born at Pergamos, Asia Minor, (130 A. D.) son of the celebrated architect Nicon. He began the study of medicine at 16, and when 20 years of age he placed himself under the instruction of eminent physicians at Smyrna, Alexandria, and elsewhere. In the year 164 he went to Rome, where he gained great renown for his skill in medicine, and also aroused the bitter jealousy of his rivals. His vast learning, his eloquence, his voluminous writings on medicine, philosophy, geometry, and grammar, gained for him the greatest admiration, and almost religious veneration. Galen was an enthusiastic admirer of Hippocrates, and used all the power of his genius and the influence of his name to bring back the practice of medicine to the foundation laid for it by Hippocrates in the study of the natural history of disease. The writings of Galen continued to have almost undisputed authority in medical practice down to the sixteenth century. (Fig. 24.) Cat. No. 143,522, U.S.N.M.

MATERIA MEDICA OF THE ANCIENT GREEKS AND ROMANS.

"About 800 years separated the periods of Aesculapius and Hippocrates. * * * Leclerc has collected a list of nearly 400 simples which he finds alluded to as remedies in the writings of Hippocrates. But these include various milks, wines, fruits, vegetables, fats, and other substances which we should hardly call drugs now. Omitting these and certain other substances which can not be identified I take from the author named the following list of medicines employed or mentioned in that far distant age:

Abrotanum.
Absinthe.
Adiantum (Maidenhair).
Agnus castus.
Algae (various).
Almonds.
Althaea.
Alum.
Amber.
Ammoniac.
Amomum.
Anagallis (veronica).
Anagyris.
Anchusa.
Anemone.
Anethum.
Anise.
Anethemis.
Aparine (goose grease).
Aristolochia.
Armenian stone.
Asphalt.
Asphodel.
Atriplex.
Baccharis.
Balm.
Basil.
Bistort.
Blite.
Brass.
Briar.
Bryony.
Burdock.
Cabbage.
Cachrys.
Calamus aromaticus.
Cantharides.
Capers.
Cardamom.
Carduus benedictus.
Carrot.
Castoreum.
Centaury.
Centipedes.
Chalcitis (red ochre).
Chenopodium.
Cinnamon.
Cinquefoil.
Clove.
Colocynth.
Coriander.
Crayfish.
Cress.
Cucumber.
Cummin.
Cyclamen.
Cytisus.
Dictamnus.
Dog.
Dracontium.
Earths (various).
Elaterium.
Elder.
Erica.
Euphorbia.
Excrement of ass, goat, mule, goose, fox.
Fennel.
Fig.
Foenugreek.
Frankincense.
Frogs.
Galbanum.
Galls.
Garlic.
Germander.
Goat (various parts).
Hawthorn.
Heather.
Hellebore.
Hemlock.
Henbane.
Honey.
Horehound.
Horns of ox, goat, and stag.
Hyssop.
Isatis.
Ivy.
Juniper.
Laserpitium.
Laurel.
Lettuce.
Licorice.
Linseed.
Loadstone.
Lotus.
Lupins.
Magnesian stone.
Mallow.
Mandragora.
Mecon. (?)
Melilot.
Mercurialis.
Minium.
Mints (various).
Mugwort.
Myrabolans.
Myrrh.
Myrtle.
Narcissus.
Nard.
Nitre.
Oak.
Oenanthe.
Oesypus.
Olive.
Onions.
Origanum.
Orpiment.
Ostrich.
Ox-gall.
Ox (liver, gall, urine).
Panax.
Parthenium.
Pennyroyal.
Peony.
Pepper.
Persea (sebestens).
Persil.
Peucedanum.
Phaseolus.
Philistium.
Pine.
Pitch.
Pomegranate.
Poppy.
Quicklime.
Quince.
Ranunculus.
Red spider.
Resin.
Rhamnus.
Rhus.
Ricinus.
Rock rose.
Rose.
Rosemary.
Ruby.
Rue.
Saffron.
Sagapenum.

Sage.
Salt.
Samphire.
Sandarach.
Scammony.
Sea water.
Secundines of a woman.
Sepia.
Serpent.
Sesame.
Seseli.
Silver.
Sisymbrium.
Solanum.
Spurge.
Squill.
Stag.
Stavesacre.
Styrax.
Succinum.
Sulphur.
Sweat.
Tarragon.
Tetragonum.
Thaspia.
Thistles.
Thlapsi.
Thuja.
Thyme.
Torpedo (fish).
Trigonum.
Tribulus.
Turpentine.
Turtle.
Umbilicus veneris.
Verbascum.
Verbena.
Verdigris.
Verjuice.
Violet.
Wax.
Willow.
Woad.
Worms.
Worm seed.

This list may be taken to have comprised pretty fairly the materia medica of the Greeks as it was known to them when Hippocrates practiced, and as it is not claimed that he introduced any new medicines it may be assumed that these formed the basis of the remedies used in the temples of Aesculapius, though perhaps some of them were only popular medicines." Chronicles of Pharmacy.—Wootton.

SOME MEDICINAL MATERIALS OF ANCIENT GREEKS AND ROMANS.

VEGETABLE DRUGS.

Mustard.—The seeds of *Brassica nigra*. According to Dioscorides (77 A. D.) as a gargle "it is useful in swelling of the tonsils and chronic roughness of the windpipe. Moistened and put in the nostrils, it excites sneezing, is useful in epilepsy, and arouses women from the paroxysms of hysteria. Mixed with figs and applied until the part becomes very red, it is good for sciatica and all chronic pains in which we seek to draw the humors from within outward, removing the disease from one place to another. Mixed with vinegar, it is a useful application for the itch and ringworm." Cat. No. 50,142, U.S.N.M.

Licorice.—Mentioned by Theophrastus (third century B. C.) as "the sweet Scythian root, good for asthma, dry cough, and all diseases of the chest." The expressed juice, equivalent to the modern "extract," is recommended by Dioscorides for irritation of the bronchial tubes, for burnings in the stomach (heart-burn), and diseases of the chest and liver. Taken with wine for irritation of the bladder and kidneys. Applied, in solution, as a healing lotion for wounds, and, in powder, for the cure of excrescences upon the eyelids. Cat. No. 50,154, U.S.N.M.

Staphisagria.—The seeds of *Delphinium staphisagria.* It was one of the medicines of Hippocrates, and was used, as now, for the destruction of vermin infesting the human body. Like many other violently irritant medicines it was used internally as well as externally. "In the dose of 10 or 15 grains, taken with honey and water, it purges the gross humors by vomiting. One who has taken it should walk about, and continue the hydromel, for it produces a feeling of suffocation, and burns unceasingly the throat." Dioscorides (first century A. D.). Cat. No. 50,367, U.S.N.M.

Maidenhair fern.—The fronds of *Adiantum capillus veneris.* Used as a remedy for croup. Cat. No. 52,445, U.S.N.M.

Carpobalsamum.—The dried fruit of a small evergreen tree growing on the shores of the Red Sea. It was in high repute with the ancients as a medicine and cosmetic. Cat. No. 52,564, U.S.N.M.

Lycium.—An extract prepared from the Indian barberry. It was held in great esteem by the Greeks and Romans, and vases made especially for containing it, bearing the name "Lycion," have been found in the ruins of Grecian cities. It was particularly valued as a collyrium in the treatment of ophthalmia. Given internally for dysentery, cough, hemorrhage from the lungs; taken with milk, for cure of hydrophobia. Cat. No. 52,571, U.S.N.M.

Tragacanth.—A gum exuding from various species of Astragalus. The drug is mentioned by Theophrastus (third century B. C.) and by other Greek physicians. "A useful ingredient of medicines for cough and roughness of the throat. Dissolved in wine, and mixed with a little calcined hartshorn or burnt alum, it is taken for pains of the kidneys and irritation of the bladder." Dioscorides. Cat. No. 52,775, U.S.N.M.

Hellebore.—The root of *Helleborus niger.* According to tradition, Melampus (1400 B. C.), cured the daughters of Proetus, King of Argos, of hysterical mania by the use of hellebore. Cooked with lentils or other broth, it was taken as a purgative. Used in gout, rheumatism, and insanity. Applied in form of plaster for dropsy. Scattered about houses to purify them from everything injurious. When about to uproot the plant, prayers were offered to Apollo and Aesculapius, and great care was taken lest an eagle should witness the operation, in which event the gatherer of the plant would surely die.—Dioscorides. Cat. No. 141,632, U.S.N.M.

Euphorbium.—A gum resin obtained from incisions made in the branches of *Euphorbia resinifera.* The collection of the drug was described by Dioscorides and Pliny and is mentioned by Galen and other early Greek writers. "The aqueous infusion applied to the eye resolves cataract. Taken with an aromatic drink it relieves the pain of sciatica. For snake bite, it is recommended to incise the skin of the head, introduce a little euphorbium and sew up the wound."—Dioscorides. Cat. No. 143,169, U.S.N.M.

Conium.—The expressed juice of the tops of *Conium maculatum.* It was a common plant in Greece, and classed among the deadly poisons. Used medicinally as a constituent of collyria to relieve pain and for plasters for wounds and erysipelas. In the treatment of poisoning by conium, emetics and purgatives were used, and as an antidote "pure wine." Among the Athenians the administration of this drug was the common mode of capital punishment, the execution of Socrates by this method being one of the notable events of Greek history. The drug was given in wine, and the victim required to walk about in order to promote its circulation throughout the body. Cat. No. 143,174, U.S.N.M.

MINERAL DRUGS

Alum.—"Alum cleanses the eye from everything that tends to obscure the vision, dissipating granulations of the lids and consuming any other excrescences. It arrests hemorrhage, contracts lax gums, and, with vinegar or honey, fixed loosened teeth. Mixed with honey it is good for ulceration of the mouth; with the dregs of vinegar and an equal quantity of the ashes of galls it is efficacious in chronic and corroding ulcers. In form of ointment it removes dandruff, and if applied with water it is a remedy for lice and nits and for burns."—Dioscorides. Cat. No. 50,168, U.S.N.M.

Rust of iron.—According to Appolodorus, Iphyclus, one of the Argonauts, was cured of impotence by iron rust dissolved in wine. Iron preparations were used at the time of Hippocrates and among the Romans at the beginning of the Christian era. Cat. No. 141,807, U.S.N.M.

Lemnian earth.—An aluminum silicate containing iron, found native in the Island of Lemnos. Does not differ from the Armenian bole except in the proportion of iron oxide. "It is collected by the inhabitants of the island, and after being washed and mixed with goat's blood it is formed into pastilles and marked with a seal. Taken with wine it is a potent remedy for deadly poisons, is an antidote for the stings and bites of venomous animals, and is useful in dysentery."—Dioscorides. Cat. No. 143,171, U.S.N.M.

Sulphur.—Administered in form of fumigation for cough, asthma, and accumulation of phlegm in the chest. Mixed with turpentine, it removes ringworm, smooths asperities of the skin, and extirpates injured nails. Applied with resin, it heals the stings of the scorpion and those of the sea dragon. Friction with sulphur and niter relieves itching of the whole body. Applied to the forehead in powder or with white of egg, it cures jaundice and catarrh. In powder sprinkled upon the body, it checks perspiraton. The fumes of sulphur received in the eyes through a reed cures blindness.—Dioscorides.

ANIMAL DRUGS

Viper.—"The flesh of the viper, cooked and eaten, sharpens the sight, is good for nervous debility, and resolves scrophulous tumors. The head and tail of the viper should be cut off before cooking; but to say that these extremities must be cut off according to a certain method I hold to be fabulous. The rest of the body, after evisceration, should be cooked with oil, wine, dill, and a little salts. Some say that those who eat vipers' flesh become very lousy, but that is false; others say that they are longer lived."—Dioscorides. Cat. No. 143,170, U.S.N.M.

Crab.—"The ashes of the burned crab, given with wine for a period of three days, in a dose of two spoonfuls, with a spoonful of gentian, is helpful to those bitten by a mad dog. Applied with honey it relieves cracks of the feet and anal fissure, and is a remedy for chilblains and cancer. The powdered shell, taken with asses' milk, is good for snake and scorpion bites."—Dioscorides. Cat. No. 143,175, U.S.N.M.

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THE INDIAN MEDICAL EXHIBIT OF THE DIVISION OF MEDICINE IN THE UNITED STATES NATIONAL MUSEUM

BY

CHARLES WHITEBREAD
Assistant Curator, Division of Medicine, United States National Museum

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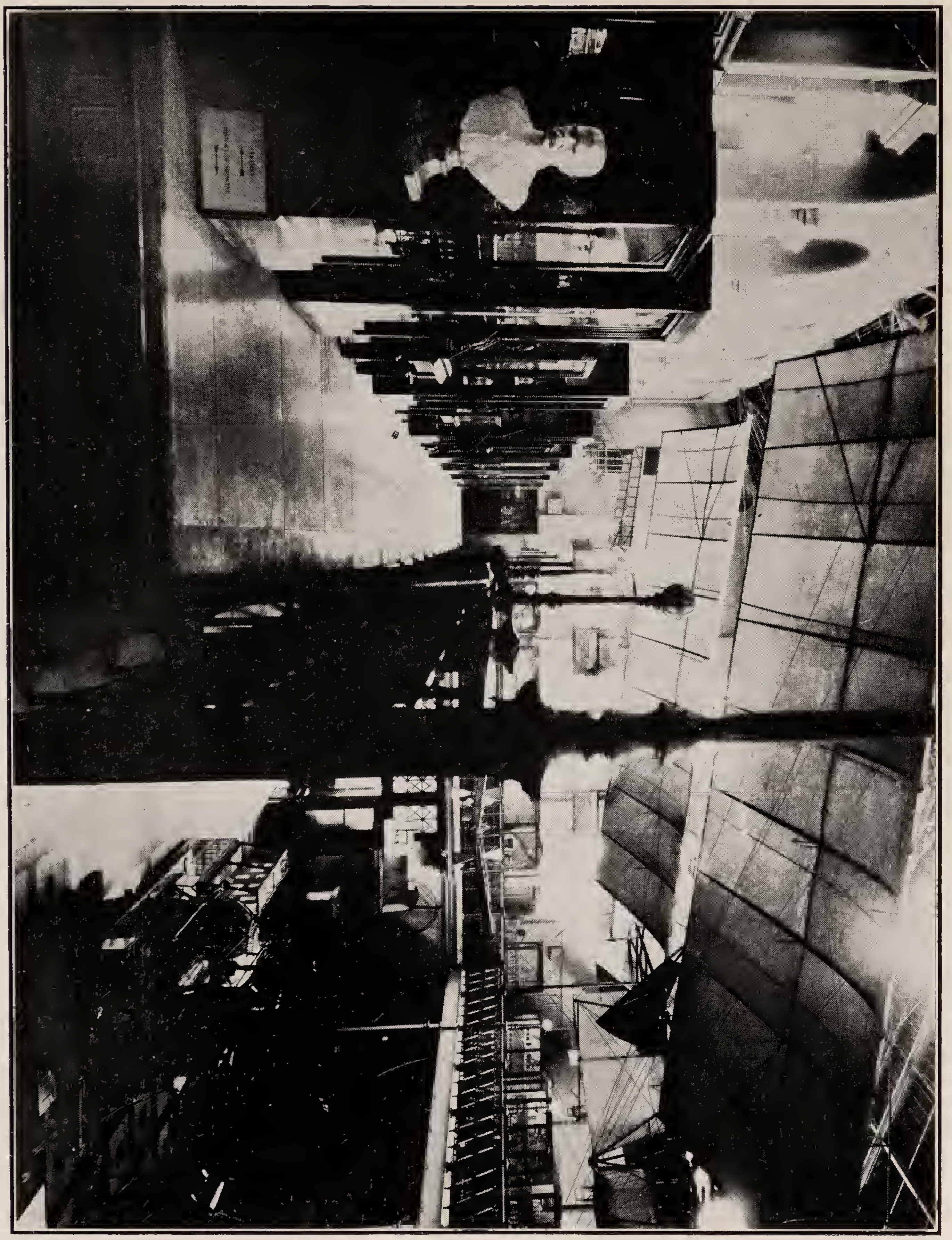

HISTORY OF MEDICINE EXHIBITS—EAST GALLERY

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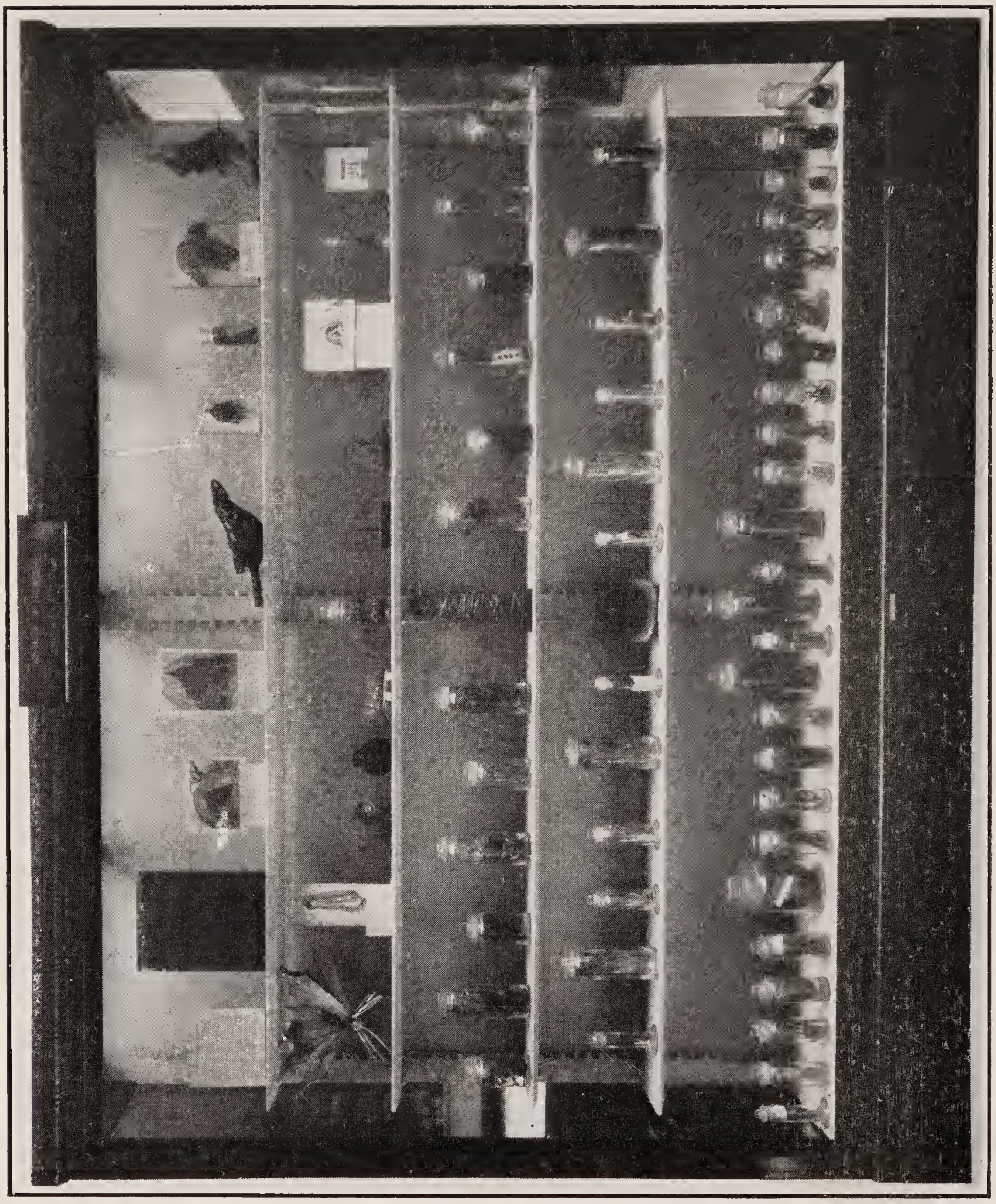

INDIAN MEDICINE EXHIBIT

FOR DESCRIPTION OF PLATE SEE PAGE 1

THE INDIAN MEDICAL EXHIBIT OF THE DIVISION OF MEDICINE IN THE UNITED STATES NATIONAL MUSEUM

By Charles Whitebread

Assistant Curator, Division of Medicine, United States National Museum

INTRODUCTION

This paper is a continuation of a previous article[1] descriptive of the history of medicine exhibits, published by the Museum to meet the demands of visitors for information, copies of labels, and pictures of specimens of these exhibits. The exhibit of American Indian medicine, herein described, was arranged by the late Dr. James M. Flint, U. S. N., who was for many years honorary curator of the division of medicine, with the assistance and cooperation of representatives of the Bureau of American Ethnology, department of anthropology, and others. The purpose of the exhibit is to illustrate original medical practices of the Indians.

Acting upon the suggestion of Prof. W. H. Holmes, then head curator of the department of anthropology, of which the division of medicine was at that time a unit, Doctor Flint arranged a series of history of medicine exhibits. Magic and psychic medicines were given first place in the series; then followed exhibits illustrating the medical practices of the ancient Egyptians, Greeks, and Romans. The Egyptians, who, according to Pliny, were the originators of the healing art, named mythological deities as the first physicians. The Greeks and Romans also assigned to medicine, as its founders and supporters, ever-ruling gods and goddesses, and the first remedies of the people of these countries were "magic." It is not surprising, then, that the Indians also associated the technique of medicine with the offices of religious worship; that the physicians of this race were connected with the priesthood; or that their remedies were principally magic.

Medical practices were much the same among the various tribes. While nothing attaining to the dignity of a science existed, still in medicine the Indians used faculties as discriminating and arrived

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[1] Proc. U. S. Nat. Mus., vol. 65, art. 15, no. 2528, 1924, pp. 1–44, figs. 1–24, pls. 1–5.

No. 2582.—Proceedings U. S. National Museum, Vol. 67, Art. 10.

at results as important and correct as those achieved by other races in a higher state of cultural advancement.

RELIGION OF THE INDIANS

The Indians believed in an enormous number of spirits existing throughout nature. These spirits were of varying power, and many tribes entertained the idea of a superior or supreme deity associated with the sky or the sun. This conception is evidently the basis for the notion of a great spirit generally attributed to the Indians by the whites. Some of these spirits were considered wholly good and some wholly bad, but as often, or rather more often, a spirit might be propitious or malevolent depending on circumstances. The Indians recognized these spirits in dreams; in numberless signs and omens among birds and beasts; they heard them talk in tempests; they saw them in dark clouds; they beset them in almost every possible angry sound which the jarring elements made; and they were even embodied in the insects which crept out of the earth.

The idea of magic power, exerted by means of spirits or through other occult powers of nature, was one of the fundamental concepts bearing on the religious life of the Indians. It existed among all the tribes. That this magic power could influence the life of man, and could in turn be influenced by human activity, was the common belief. This belief in magic power being strong in the Indian mind, all his actions were regulated by the desire to maintain control over it.

MEDICINE OF THE INDIANS

The following, concerning the medicine of the Indians, is from the Bureau of American Ethnology's Bulletin 30, Handbook of American Indians:

> In general the tribes show many similarities in regard to medicine, but the actual agents employed differ with the tribes and localities, as well as with individual healers. Magic, prayers, songs, exhortation, suggestion, ceremonies, fetiches, and certain specifics and mechanical processes are employed only by the medicine men or medicine women; other specific remedies or procedures are proprietary, generally among a few old women in the tribe; while many vegetal remedies and simple manipulations are of common knowledge in a given locality.
>
> The employment of magic consists in opposing a supposed malign influence, such as that of a sorcerer, spirits of the dead, mythic animals, etc., by the supernatural power of the healer's fetiches and other means. Prayers are addressed to benevolent deities and spirits, invoking their aid. Healing songs, consisting of prayers or exhortations, are sung. Harangues are directed to evil spirits supposed to cause the sickness, and often are accentuated by noises to frighten such spirits away. Suggestion is exercised in many ways directly and indirectly. Curative ceremonies usually combine all or most of the agencies mentioned.

MEDICINE MEN

Each tribe had men who professed to mediate between the world of spirits and the world of men. The designation and functions of these persons differed considerably in the various tribes, but they may be classed roughly as priest-doctors, prophet-doctors, and herbalist doctors.

Priest-doctors.—The priest-doctor was a magician and the art which he practiced was magic. In some tribes the men who practiced this art formed into societies or associations. They were admitted by a public ceremony, after having been instructed in private, and given evidence of their skill and fitness. Anyone could become a follower and practicer of this art. The priest-doctors assembled to teach the art of supplicating spirits. These practitioners are to be distinguished from the true priests, whose positions and functions were tribal instead of individual.

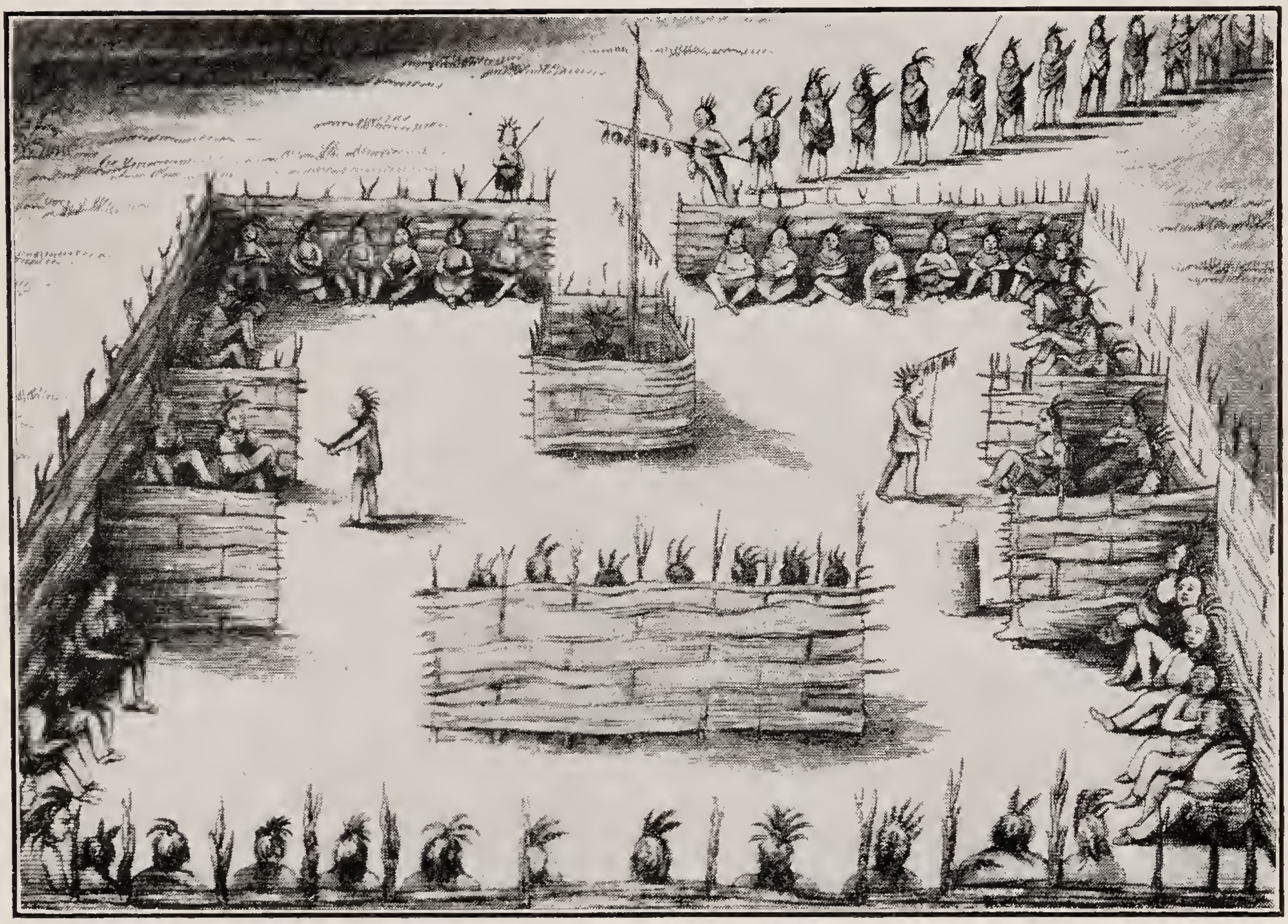

FIG. 1.—PRIEST-DOCTOR'S LODGE

Catlin[2] describes the practice and dress of the medicine man pictured in figure 2 as follows:

> Here is a gentleman who gains laurels without going to war—who stays at home and takes care of the women and children. His fame and influence, which often exceed that of the chief of the tribe, is gained without risk of life, but by a little legerdemain and cunning, which are easily practiced upon a superstitious people, who are weak enough to believe that his mystic arts often produce miracles, and which, like all miracles, are difficult to prove or to disprove.

---

[2] Life Amongst the Indians. By George Catlin.

Whilst residing in the American Fur Company's factory at the mouth of the Yellowstone River, on the upper Missouri, I had the opportunity of witnessing a Blackfoot doctor's display, in this identical costume, over a dying patient who breathed his last under his strange and even frightful gesticulations and growls and groans under this skin of a yellow bear—hopping over and over his patient whom he had placed on the ground, and was pawing about with his hands and feet, in the manner that a bear might have done.

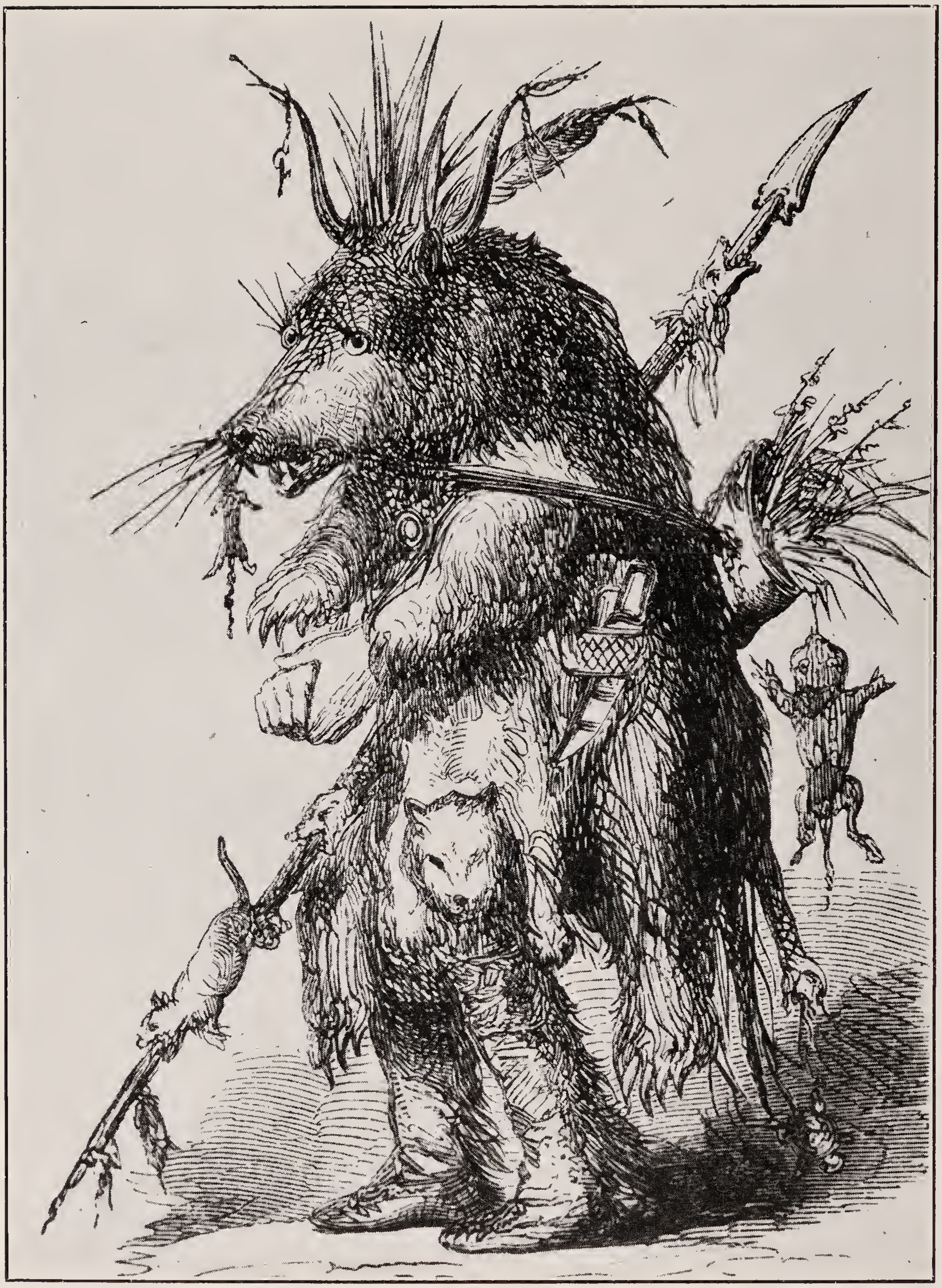

FIG. 2.—A BLACKFOOT PRIEST-DOCTOR

Each one of these Indian physicians, during his lifetime of practice, conjures up and constructs some frightful conception for his medicine dress, strung with skins of deformed animals, reptiles, and birds; the hoofs of animals, the claws and toenails of birds, the skins of frogs, of toads, of bats, and everything else that he can gradually gather, to consummate ugliness of looks and frightfulness of sounds by their grating and rattling noises as he dances underneath them, with his face hidden, adding to them the frightful flats and sharps of his growling and squeaking voice, and the stamping of his feet as he dances and jumps over and around his dying patient.

The doctor never puts on this frightful dress until he goes to pay his last visit to his patient, and when he moves through the village with this dress on it is known to all the villagers that the patient is dying; and from sympathy, as well as from a general custom, they all gather around in a crowd to witness the ceremony; and all, with the hand over the mouth, commence crying and moaning in the most pitiable manner.

Prophet-doctors.—The art of the Indian prophet was practiced alone, by solitary and distinct individuals who had no associates. Prophets sprang up at long intervals and far apart among the Indian tribes. They professed to be under supernatural power and to be filled with a divine afflatus. The art which they practiced resembled that of the priest-doctors, differing chiefly in the object sought. The priest-doctor sought to control or influence events; the prophet to predict them. Both applied to spirits for their power. Both used material substances, such as stuffed birds, bones, etc., as objects by or through which the secret energy was to be exercised. The general modes of operation were similar. The seventh annual report of the Bureau of American Ethnology contains the following with reference to Indian prophets among the Ojibwa Indians:

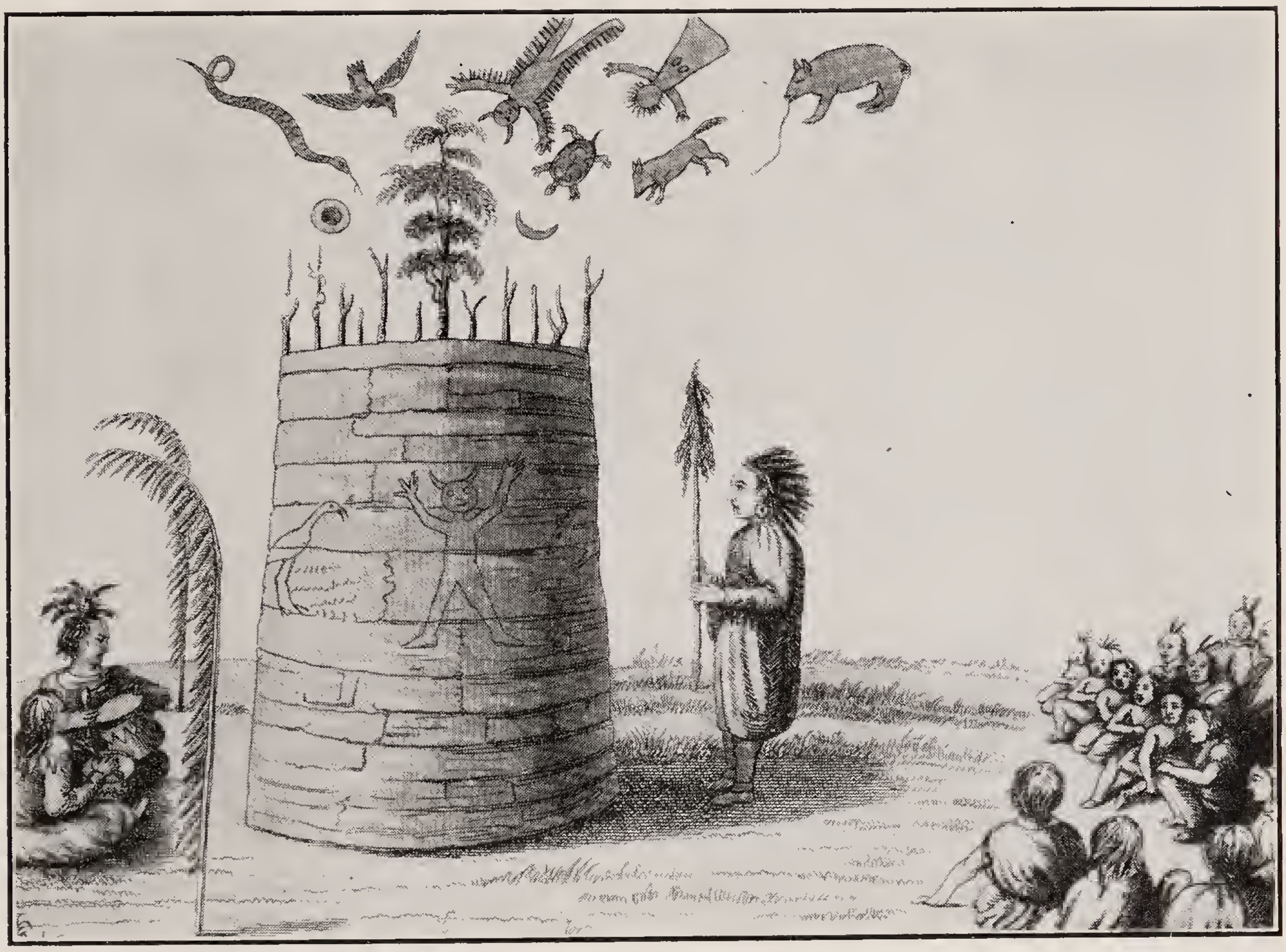

FIG. 3.—INDIAN PROPHET'S LODGE

> The jessakkid is a seer and prophet; though commonly designated a "juggler." the Indians define him as a "revealer of hidden truths." There is no

association whatever between the members of this profession, and each practices his art singly and alone whenever a demand is made and the fee presented. As there is no association, so there is no initiation by means of which one may become a jessakkid. The gift is believed to be given by the thunder god, and then only at long intervals and to a chosen few. * * * The exorcism of demons is one of the chief pretentions of this personage, and evil spirits are sometimes removed by sucking them through tubes. * * * (See figs. 4 and 12.) The lodge (fig. 3) used by this class of men consists of four poles planted in the ground, forming a square of 3 or 4 feet and upward in diameter, around which are wrapped birch bark, robes, or canvas in such a way as to form an upright cylinder. * * * When the prophet has seated himself within his lodge the structure begins to sway violently from side to side, loud thumping noises are heard within, denoting the arrival of spirits, and numerous voices and laughter are distinctly audible to those without. Questions may then be put to the prophet and, if everything be favorable, the response is not long in coming."

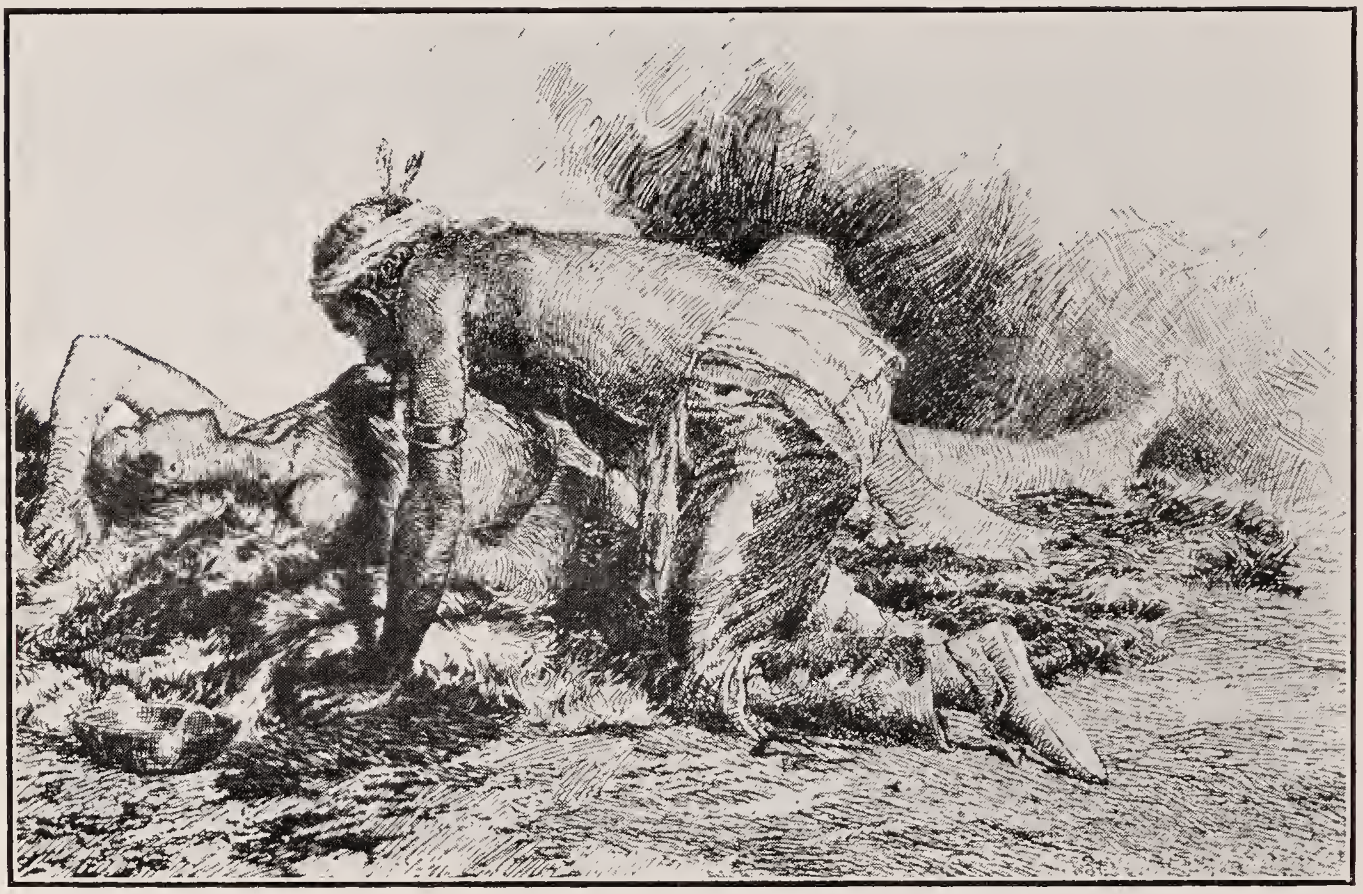

FIG. 4.—MEDICINE MAN REMOVING DISEASE

Herbalist doctors.—These persons, men and women, were the real physicians of the tribes. They administered liquid and dry medicines, bled patients, cupped with a horn, and operated on ulcers, swellings, wounds, etc. Although herbalists were aware that certain plants, roots, etc., would produce a definite effect upon the human system, they attributed any benefit obtained therefrom to the fact that the remedies were distasteful and injurious to the demons in the system and to whom the disease was attributed.

In figure 5 the doctor is seated upon a mat inside of a rude tent, holding between his feet a vessel, the contents of which he is stirring with his right hand; with his left hand he shakes a rattle, meantime reciting certain incantations whereby he potentizes his drugs. Figure 6 pictures the doctor, seated by the side of a sick man, shaking a rattle and invoking the assistance of friendly spirits to drive out the malicious spirits which are causing the sickness. A bowl of medicine (fig. 14) is at hand which the doctor usually sprinkles or blows upon the patient in the intervals of the invocations.

ORIGIN OF DISEASE AND MEDICINE

The Indians believed that disease was not natural, but was due to the evil influence of animal spirits, ghosts, witches, etc., or to the absence of the soul. Some tribes believed in several souls, the loss of one of which caused partial loss of life, that is, sickness, while the loss of all, or of the principal one, entailed death.

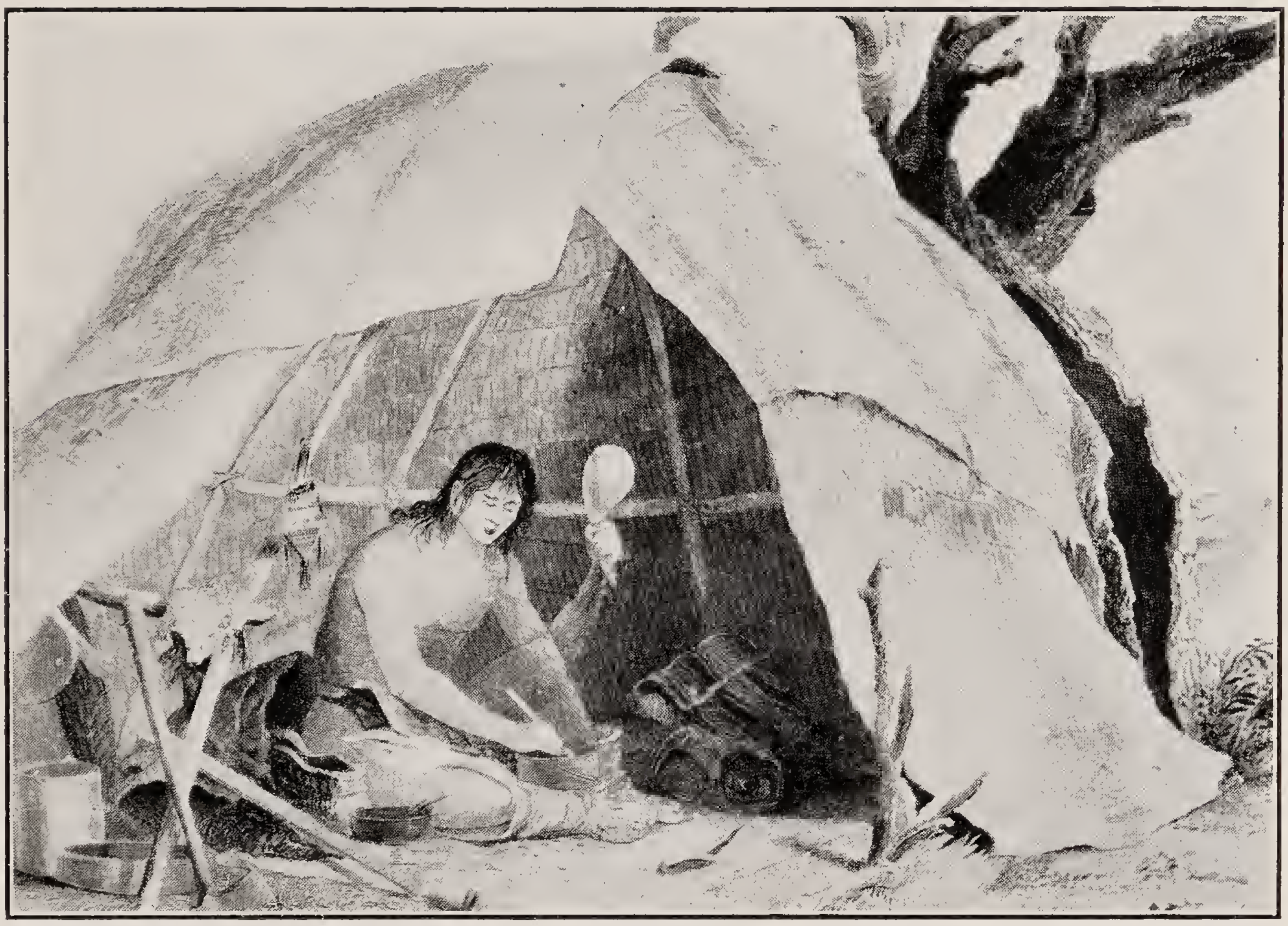

FIG. 5.—HERBALIST DOCTOR PREPARING MEDICINE

Mooney in his Sacred Formulas of the Cherokees gives the following interesting account of this particular tribe's belief concerning the origin of disease and medicine:

> In the old days quadrupeds, birds, fishes, and insects could all talk, and they and the human race lived together in peace and friendship. But as time went on the people increased so rapidly that their settlements spread over the whole earth and the poor animals found themselves beginning to be cramped for room. This was bad enough, but to add to their misfortunes man invented bows, knives, blowguns, spears, and hooks, and began to slaughter the larger animals, birds, and fishes for the sake of their flesh or their skins, while the smaller creatures, such as the frogs and worms, were crushed and trodden upon without mercy, out of pure carelessness or contempt. In this state of affairs the animals resolved to consult upon measures for their common safety.

The bears were the first to meet in council in their town house in Kuwahi, the "Mulberry Place," and the old White Bear Chief presided. After each in turn had made complaint against the way in which man killed their friends, devoured their flesh and used their skins for his own adornment, it was unanimously decided to begin war at once against the human race. Some one asked what weapons man used to accomplish their destruction. "Bows and arrows, of course," cried all the bears in chorus. "And what are they made of?" was the next question. "The bow of wood and the string of our own entrails."

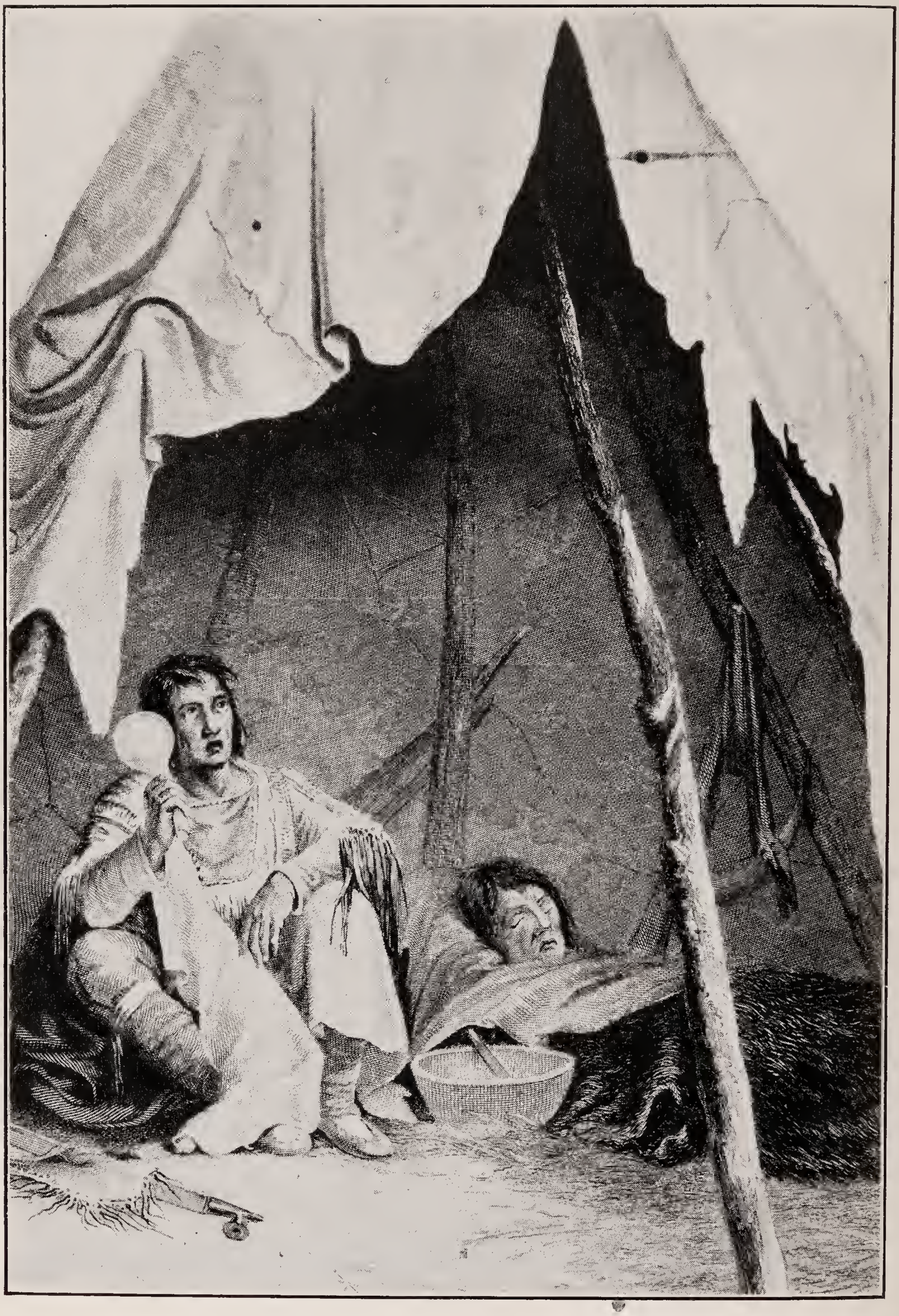

Fig. 6.—Medicine man administering to patient

replied one of the bears. It was then proposed that they make a bow and some arrows and see if they could not turn man's weapons against himself. So one bear got a nice piece of locust wood and another sacrificed himself for the good of the rest in order to furnish a piece of his entrails for the string. But when everything was ready and the first bear stepped up to make the trial it was found that in letting the arrow fly after drawing back the bow his long claws caught the string and spoiled the shot. This was annoying, but another suggested that he could overcome the difficulty by cutting his claws, which was accordingly done, and on a second trial it was found that the arrow went straight to the mark. But here the chief, the old White Bear, interposed and said that it was necessary that they should have long claws in order to be able to climb trees. " One of us has already died to furnish the bowstring and if we now cut off our claws we shall all have to starve together. It is better to trust to the teeth and claws which nature has given us, for it is evident that man's weapons were not intended for us."

No one could suggest any better plan, so the old chief dismissed the council and the bears dispersed to their forest haunts without having concerted any means for preventing the increase of the human race. Had the results of the council been otherwise, we should now be at war with the bears, but as it is the hunter does not even ask the bear's pardon when he kills one.

The deer next held a council under their chief, the Little Deer, and after some deliberation resolved to inflict rheumatism upon every hunter who should kill one of their number, unless he took care to ask their pardon for the offense. They sent notice of their decision to the nearest settlement of Indians and told them at the same time how to make propitiation when necessity forced them to kill one of the deer tribe. Now, whenever the hunter brings down a deer, the Little Deer, who is swift as the wind and can not be wounded, runs quickly up to the spot and bending over the bloodstains asks the spirit of the deer if it has heard the prayer of the hunter for pardon. If the reply be " Yes " all is well and the Little Deer goes on his way, but if the reply be in the negative he follows on the trail of the hunter, guided by the drops of blood on the ground, until he arrives at the cabin in the settlement, when the Little Deer enters invisibly and strikes the neglectful hunter with rheumatism, so that he is rendered on the instant a helpless cripple. No hunter who has regard for his health ever fails to ask pardon of the deer for killing it, although some who have not learned the proper formula may attempt to turn aside the Little Deer from his pursuit by building a fire behind them in the trail.

Next came the fishes and reptiles, who had their own grievances against humanity. They held a joint council and determined to make their victims dream of snakes twining about them in slimy folds and blowing their fetid breath in their faces, or to make them dream of eating raw or decaying fish, so that they would lose appetite, sicken, and die. Thus it is that snake and fish dreams are accounted for.

Finally the birds, insects, and smaller animals came together for a like purpose, and the grubworm presided over the deliberations. It was decided that each in turn should express an opinion and then vote on the question as to whether or not man should be deemed guilty. Seven votes were to be sufficient to condemn him. One after another denounced man's cruelty and injustice toward the other animals and voted in favor of his death. The frog spoke first and said: " We must do something to check the increase of the race or people will become so numerous that we shall be crowded from off the earth. See how man has kicked me about because I'm ugly, as he says, until my back is covered with sores; " and here he showed the spots on his skin. Next came the bird, who condemned man because "he burns my feet off," alluding to the way in which the hunter barbecues birds by impaling them on a stick set over the fire, so that their feathers and tender feet are singed and burned. Others followed in the same strain. The ground squirrel alone ventured to say a word in behalf of man, who seldom hurt him because he was so small; but this so enraged the others that they fell upon the ground squirrel and tore him with their teeth and claws, and the stripes remain on his back to this day.

The assembly then began to devise and name various diseases, one after another, and had not their invention finally failed them not one of the human race would have been able to survive. The grubworm in his place of honor hailed each new malady with delight, until at last they had reached the end of the list, when some one suggested that it be arranged so that menstruation should sometimes prove fatal to woman. On this he rose up in his place and cried: "Thanks! I'm glad some of them will die, for they are getting so thick that they tread on me." He fairly shook with joy at the thought, so that he fell over backward and could not get on his feet again, but had to wriggle off on his back, as the grubworm has done ever since.

When the plants, who were friendly to man, heard what had been done by the animals, they determined to defeat their evil designs. Each tree, shrub, and herb, down even to the grasses and mosses, agreed to furnish a remedy for some of the diseases named, and each said: "I shall appear to help man when he calls upon me in his need." Thus did medicine originate, and the plants, every one of which has its use if we only knew it, furnish the antidote to counteract the evil wrought by the revengeful animals. When the doctor is in doubt what treatment to apply for the relief of a patient, the spirit of the plant suggests to him the proper remedy.

INDIAN THEORIES OF DISEASE

The Indians believed that disease was caused by:

1. A malevolent spirit which assumed material form either animate or inanimate and attacked the victim with or without provocation.
2. A spirit, or an object supernaturally injected into a person, which acted at the suggestion of a human enemy who possessed supernatural powers.
3. The angered spirits of the dead, or those of animals, plants, and other natural objects.
4. Absence of the patient's soul.

ARRANGEMENT OF EXHIBITS

Magic medicine.—Exorcism; Invocation; Incantation; Amulets and charms; Talismans; Fetiches; Transference of disease; Signatures; Evil eye.

Pharmacological medicine.—Some drugs of the Indians.

Surgical medicine.—Sudatory (sweat) bath; Venesection; Cupping; Cautery.

MAGIC MEDICINE

Magic is the "pretended art of producing supernatural effects by bringing into play the action of supernatural beings, of departed spirits, or of the occult powers of nature." The application of magic to the treatment of disease is magic medicine, exerted through gods or demons, disembodied spirits of men, animals, plants, or minerals, or by occult powers residing in certain natural objects.

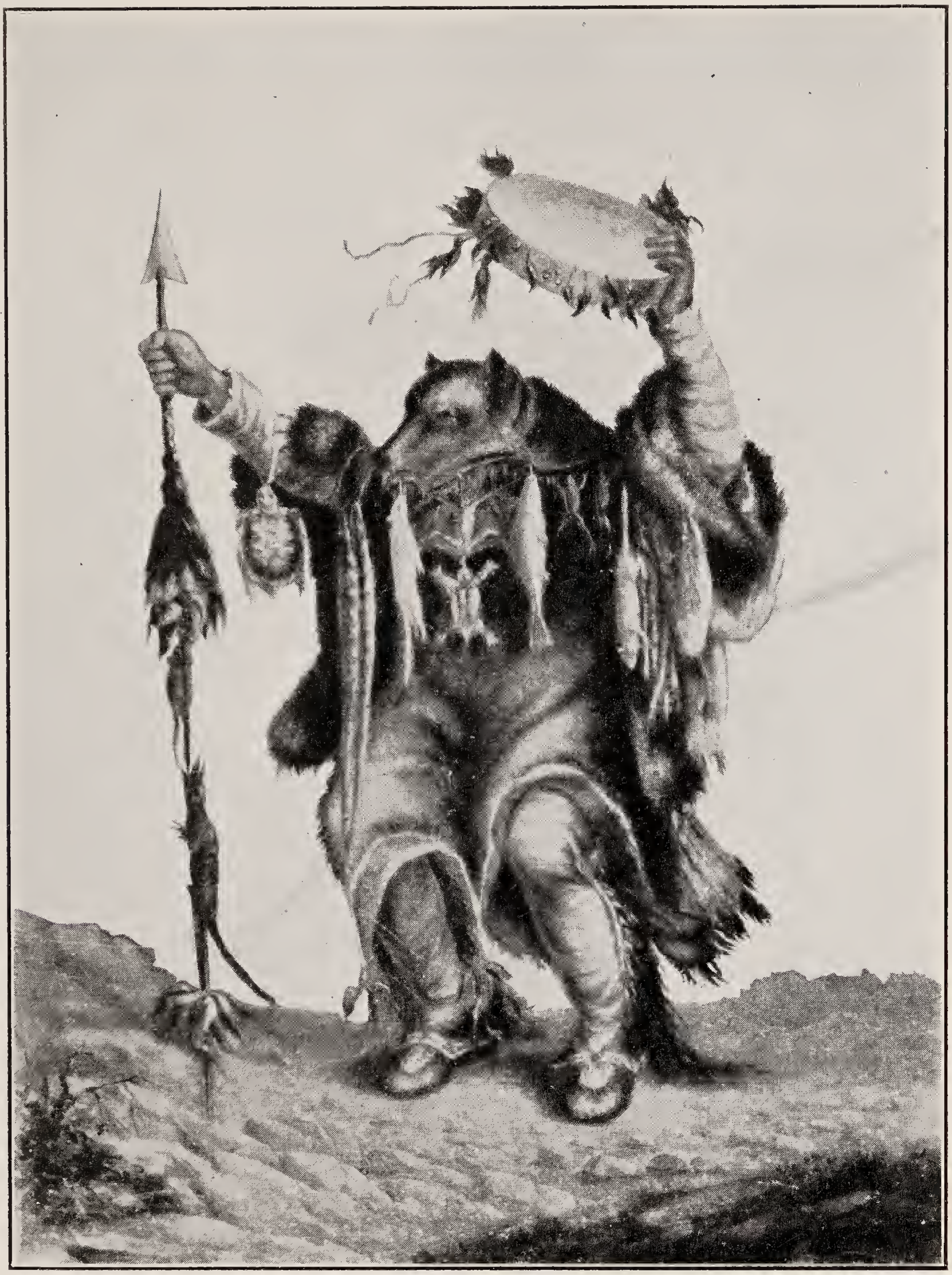

FIG. 7.—SIOUX MEDICINE MAN

Type specimens, and descriptive information, illustrating how the Indians brought these magic agents and influences into action for the cure of disease are assembled in the exhibit under the head of magic medicine.

Exorcism.—Exorcism is the practice of casting out evil spirits by religious or magic formulas or ceremonies. The Indian medicine man, in the exercise of the function of physician, strove to exorcise the malignant spirits by means of intimidation or cajolery, or through the intervention of friendly spirits more powerful than the disease spirit.

Sioux medicine man.—Picture of the costume worn by the medicine man or priest-doctor while exorcising the evil spirits of disease. Clad in the skin and mask of a bear with pendants of various small animals, he carries in one hand a drum, and in the other a spear with a carved and decorated shaft (fig. 7). Cat. No. 143117, U.S.N.M.

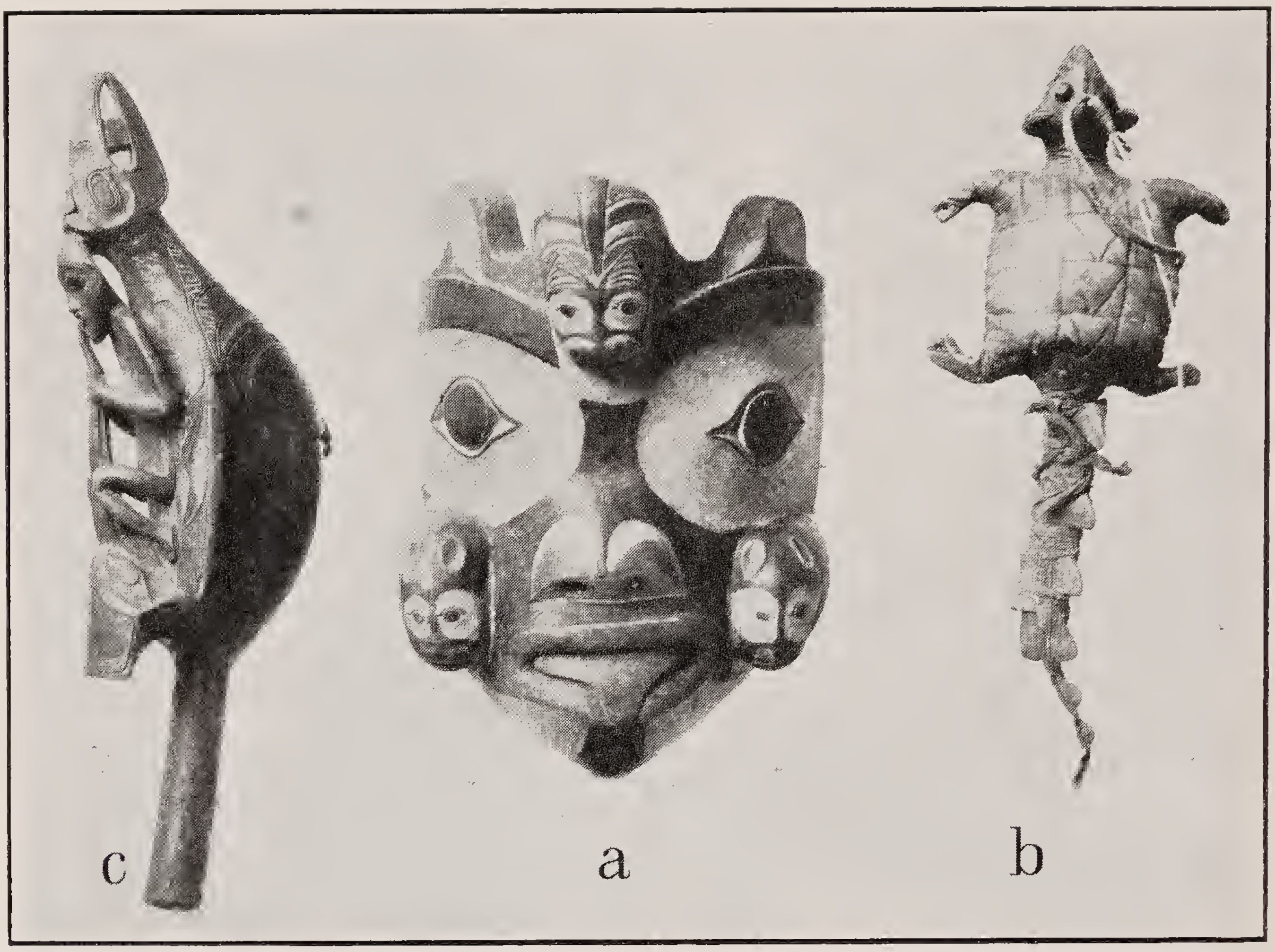

FIG. 8.—ANIMAL MASK AND RATTLES

Mask.—Worn by Indian medicine man in the practice of exorcism (fig. 8*a*). Cat. No. 67957, U.S.N.M.

Turtle rattle.—Used by Indian medicine man in the practice of exorcism (fig. 8*b*). Cat. No. 165848, U.S.N.M.

Raven rattle.—A hollow wooden figure, carved in imitation of a raven, bearing upon its back a recumbent figure representing a sick man, from whose mouth another raven is drawing out the materialized spirit of disease. The cavity of the bird contains numerous small pebbles. Used by the medicine men in Alaska, while preparing medicine and in the ceremony of exorcism (fig. 8*c*). Cat. No. 9256, U.S.N.M.

Invocations.—Invocations are among the oldest, most persistent, and most universally practiced means employed for the cure of disease. Prayers invoking the assistance of disembodied spirits of men or animals were commonly used by the Indians as an accompaniment of other remedial agencies.

Indian invocation.—For the cure of rheumatism. The common belief of the Cherokee Indians regarding rheumatism is that it is caused by the revengeful spirits of slain animals, especially deer. The disease can only be driven out by some more powerful animal spirit. The doctor invokes the aid of the red dog of the east, the blue dog of the north, the black dog of the west, the white dog of the south, and finally the white terrapin of the mountain, in separate prayers. While reciting the prayers the doctor rubs the afflicted part with a warm solution of fern roots and at the end of each he blows once upon the part.

The invocation is as follows:

"Listen! Ha! In the Sun Land you repose, O Red Dog. O now you have swiftly drawn near to hearken. O great adawehi, you never fail in anything. O, appear and draw near running, for your prey never escapes. You are now come to remove the intruder. Ha! You have settled a very small part of it far off there at the end of the earth.

"Listen! Ha! In the Frigid Land you repose, O Blue Dog. O now you have swiftly drawn near to hearken. O great adawehi, you never fail in anything. O, appear and draw near running, for your prey never escapes. You are now come to remove the intruder. Ha! You have settled a very small part of it far off there at the end of the earth.

"Listen! Ha! In the Darkening Land you repose, O Black Dog. O now you have swiftly drawn near to hearken. O great adawehi, you never fail in anything. O, appear and draw near running, for your prey never escapes. You are now come to remove the intruder. Ha! You have settled a very small part of it far off there at the end of the earth.

"Listen! On Wahala you repose, O White Dog. Oh, now you have swiftly drawn near to hearken. O great adawehi, you never fail in anything. O, appear and draw near running, for your prey never escapes. You are now come to remove the intruder. Ha! You have settled a very small part of it far off there at the end of the earth.

"Listen! On Wahala you repose, O White Terrapin. O, now you have swiftly drawn near to hearken. O great adawehi, you never fail in anything. Ha! It is for you to loosen its hold on the bone. Relief is accomplished."

Mooney's Sacred Formulas of the Cherokees.

Cat. No. 143087, U.S.N.M.

Incantations.—Magical words or phrases recited or sung. The use of incantations arose from the belief that maladies had a superhuman origin. The ceremonial use of words, verses, songs, etc., as incantations were commonly used by the Indians to prevent and cure disease.

Schoolcraft gives the following as a specimen of the chants used by a Dakotah medicine man:

Flying godlike, I encircle the heavens.
I enlighten the earth to its center,
The little ox (the struggling patient) lies struggling on the earth.
I lay my arrow on the string.

The manner of the doctor who used this incantation was such as to impress the patient that he (the doctor) was conscious that it expressed his own abilities.

Amulets and charms.—All races have trusted largely to amulets and charms for the prevention and treatment of diseases. They are objects to which is attributed magical influence or power, so as to fascinate or to help or protect.

Charms for preventing or curing disease were the common resort of the Indians. These charms were of various kinds; generally from the animal or mineral kingdom, but sometimes from the vegetable kingdom.

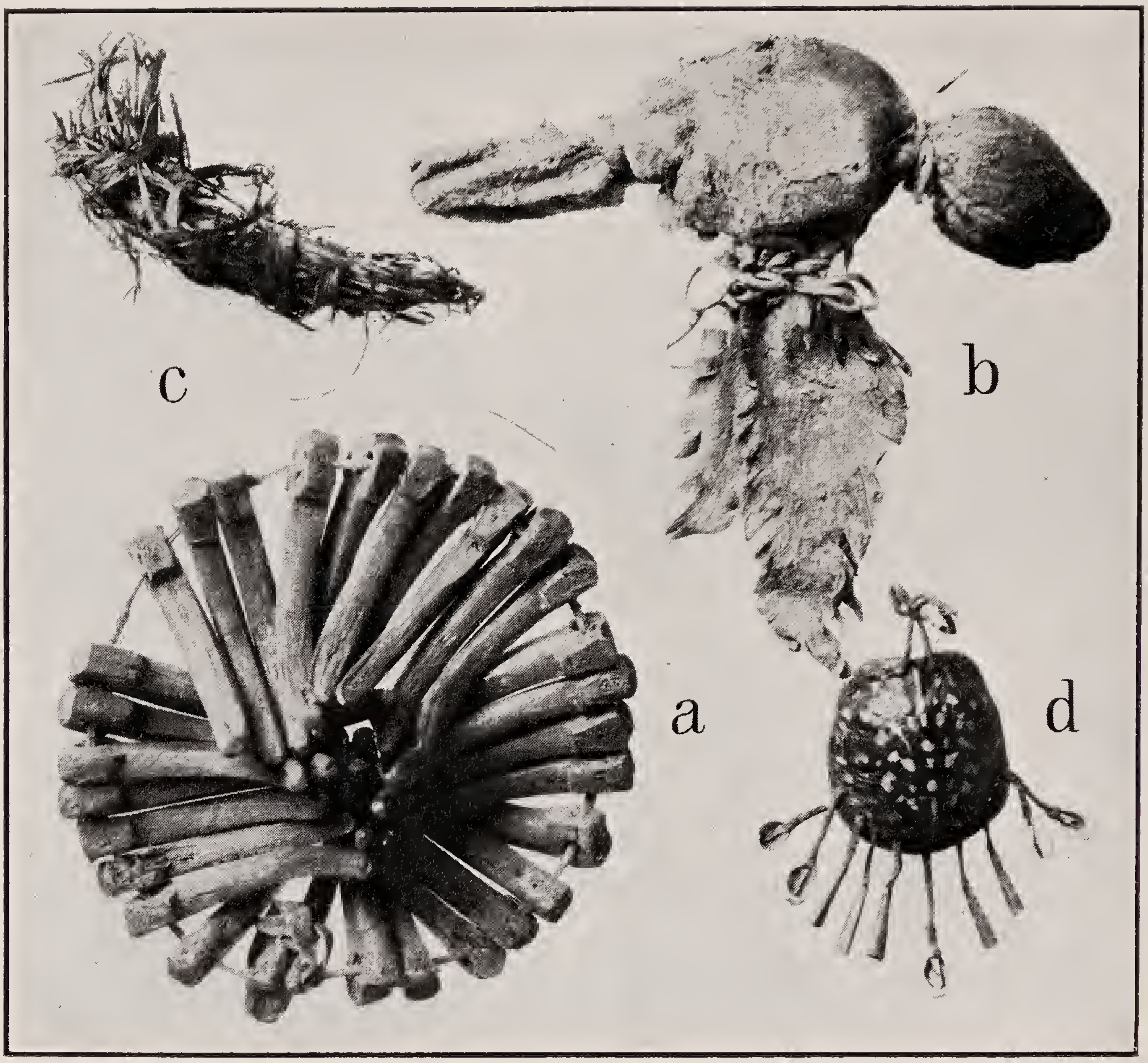

FIG. 9.—AMULETS AND CHARMS

Amulet.—Bear's claws strung upon a deerskin thong. Frequently worn as a necklace by the American Indians (fig. 9*a*). Cat No. 143098. U.S.N.M.

Pah Ute Indian amulet.—A deerskin pouch divided into three pockets, one containing the leaves of a shrub, another a root, and the third shredded bark. Worn by the Pah Utes as a protective against disease and accident (fig. 9*b*). Cat. No. 19069, U.S.N.M.

Klamath Indian amulet.—Twigs of a shrub bound together with strips of bark. Worn suspended from the neck (fig. 9*c*). Cat. No. 24129, U.S.N.M.

Cheyenne Indian amulet.—A shell of a box tortoise, with pendants of small shells and metal drops (fig. 9d). Cat. No. 165954, U.S.N.M.

Talismans.—Talismans are material objects, which are supposed to work wonders whether kept in one's possession or not.

Talisman.—A bunch of white feathers, stained with red paint. One of the numerous articles comprising the paraphernalia of an Indian medicine man (fig. 10). Cat. No. 143099, U.S.N.M.

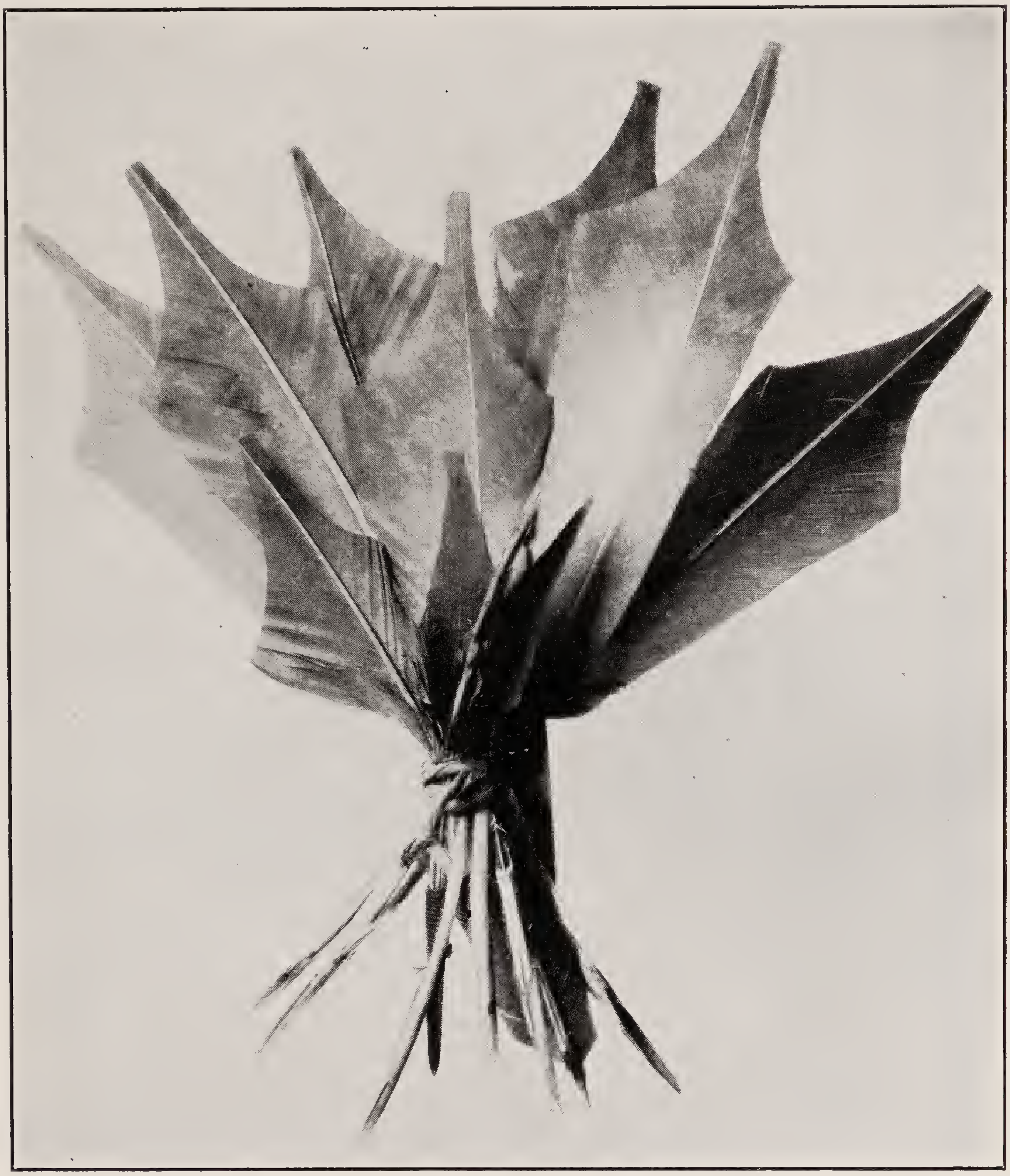

FIG. 10.—TALISMAN

Fetiches.—Material objects believed to be the dwelling of a spirit, or to represent a spirit, that may be induced or compelled to help the possessor.

Alaskan Indian fetich.—Carved out of a block of wood in imitation of a naked Indian in the attitude of, and probably impersonating, a quadruped. One of the articles composing the outfit of an Alaskan Indian medicine man (fig. 11*a*). Cat. No. 143105, U.S.N.M.

Zuni fetich.—A clay image of the mountain lion. The spirit of the mountain lion guards the north, and is master of the gods of the hunt. The hunter makes invocation to the indwelling spirit of this image for assistance in the pursuit of game, and for protection against injury (fig. 11*b*). Cat. No. 128669, U.S.N.M.

Indian fetich.—A beaver's tooth suspended by a deerskin strap, the lower part of which is ornamented with minute beads of various colors. Like other fetiches, this is used to cause or cure disease. The medicine man often pretends to extract some of these teeth from the body of the sick man, thus curing the disease by removing the cause (fig. 11*c*). Cat. No. 143489 U.S.N.M.

Transference of disease.—The medicine men of the Indians frequently treated by means of suction. Sometimes the medicine men were believed to have gods in their bodies in the form of lizards, frogs, leeches, tortoises, snakes, etc., which served as suction pumps in extracting disease. When an Indian doctor was to operate upon a suffering patient, he placed the sufferer upon a blanket on the ground with the body almost naked. After chants, prayers, the use of the rattle, and many other ceremonies, the doctor got down on his knees and applied suction to the affected part. After sucking thus for a considerable time, the doctor would arise to his feet in apparent agony, groaning, pounding his sides, writhing, and holding a dish of water to his mouth, he proceeded with a singsong bubbling to deposit in the dish the disease which had been drawn from the sick person (figs. 4 and 12).

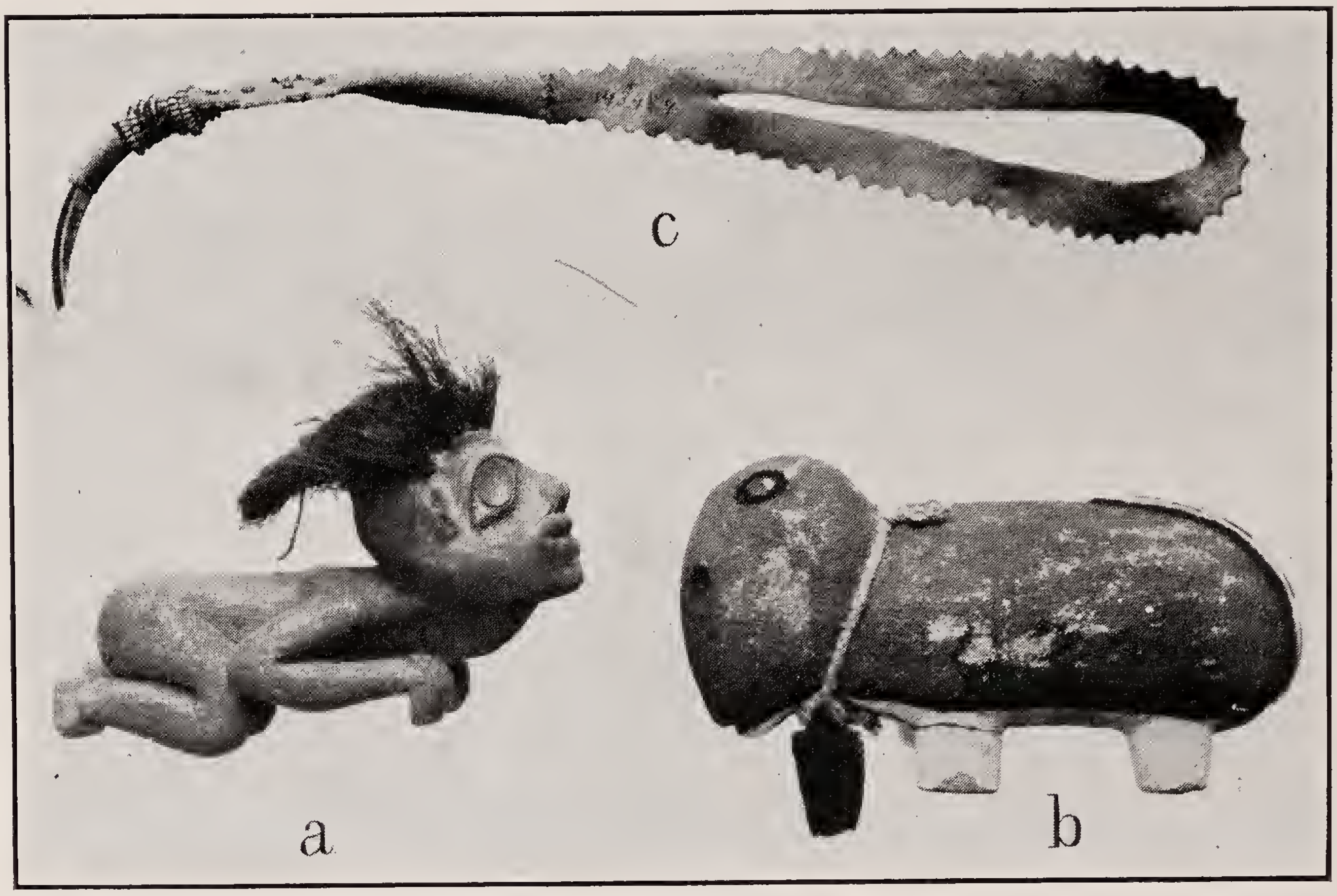

Fig. 11.—Fetiches

Bone tube.—An instrument used by the medicine man, by means of which he sucked out with his mouth the cause of disease from the body of the patient. The doctor pretended to swallow the bone tube, and after a time to vomit it together with the poison of the disease (figs. 4 and 12). Cat. No. 141167, U.S.N.M.

Signatures.—Some outward sign appearing upon plants and other objects believed to indicate their medicinal use. The belief in European countries was that the Creator in providing herbs for the service of man had stamped on them, at least in many instances, an unmistakable sign of their special remedial value. In most cases the Indians selected the remedy by some imaginary relation between the physical qualities of the drug and the symptoms of the disease. For a disease caused by the rabbit the antidote must be a plant called rabbit's foot, rabbit's ear, or rabbit's tail; for snake dreams the plant used is snake's tooth; for worms a plant resembling a worm in appearance, and for inflamed eyes a flower having the appearance and name of deer's eye.

Maidenhair fern (*Adiantum pedatum*).—Used either in decoction or poultice for rheumatism, generally in connection with some other fern. The doctors explain that the fronds of ferns are curled up in the young plant but unroll and straighten out as it grows, consequently a decoction of ferns causes the contracted muscles of the rheumatic patient to unbend and straighten out in like manner (fig. 13). Cat. No. 143490, U.S.N.M.

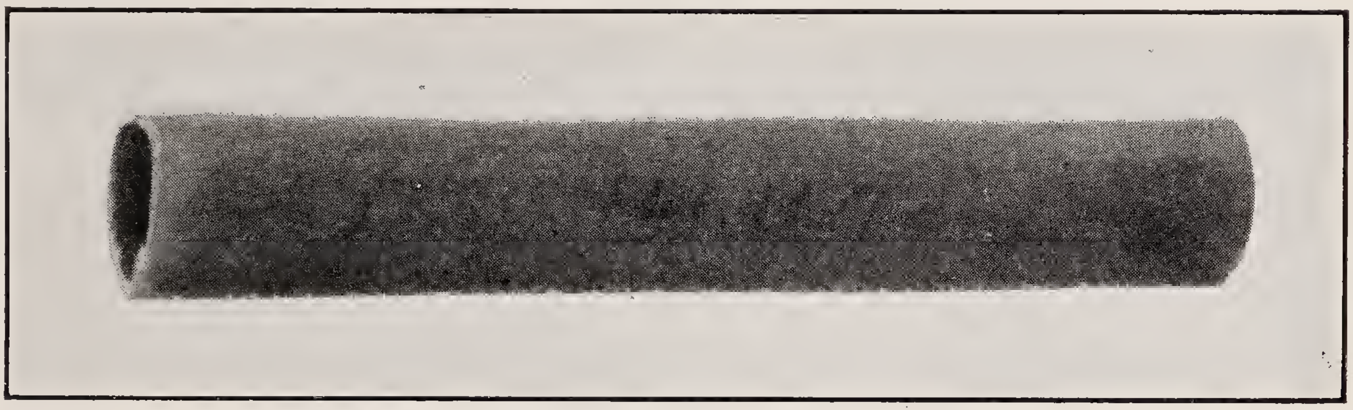

FIG. 12.—BONE TUBE

Evil eye.—The belief in the power of some persons to bring misfortune, sickness, and even death to men or animals by gazing at them is one of the most ancient, widespread, and persistent of human superstitions. This belief was universal among savage and partly civilized people everywhere. A belief prevailed among the Indians that the medicine man possessed powers of conjuration and a godlike power of killing those against whom he might hurl his direful charms or glances. The Indians would hide or avert their heads in the presence of medicine men to escape their glances.

Horns.—Horns, in one form or another, were of all objects the most common defense against the evil eye. The North American Indians wore horns to ward off that awful, universal, unescapable, mystic glance that has continually harassed man in all quarters of the globe (fig. 17). Cat. No. 143503 U.S.N.M.

PHARMACOLOGICAL MEDICINE

The Indians practiced a sort of domestic or empirical medicine in which drugs were the principal agents. But even in this method of treatment the selection of the remedy was more often determined by some imaginary relation between the physical qualities of the drug and the symptoms of the disease than by proof of its efficacy. The knowledge possessed by the Indians concerning plants and their therapeutic uses was superficial, and the popular impression regarding the medical skill of the Indian doctor in this respect is erroneous.

The following concerning animal, mineral, and vegetable drugs used by the Indians is from the Bureau of American Ethnology's Bulletin 30, Handbook of American Indians:

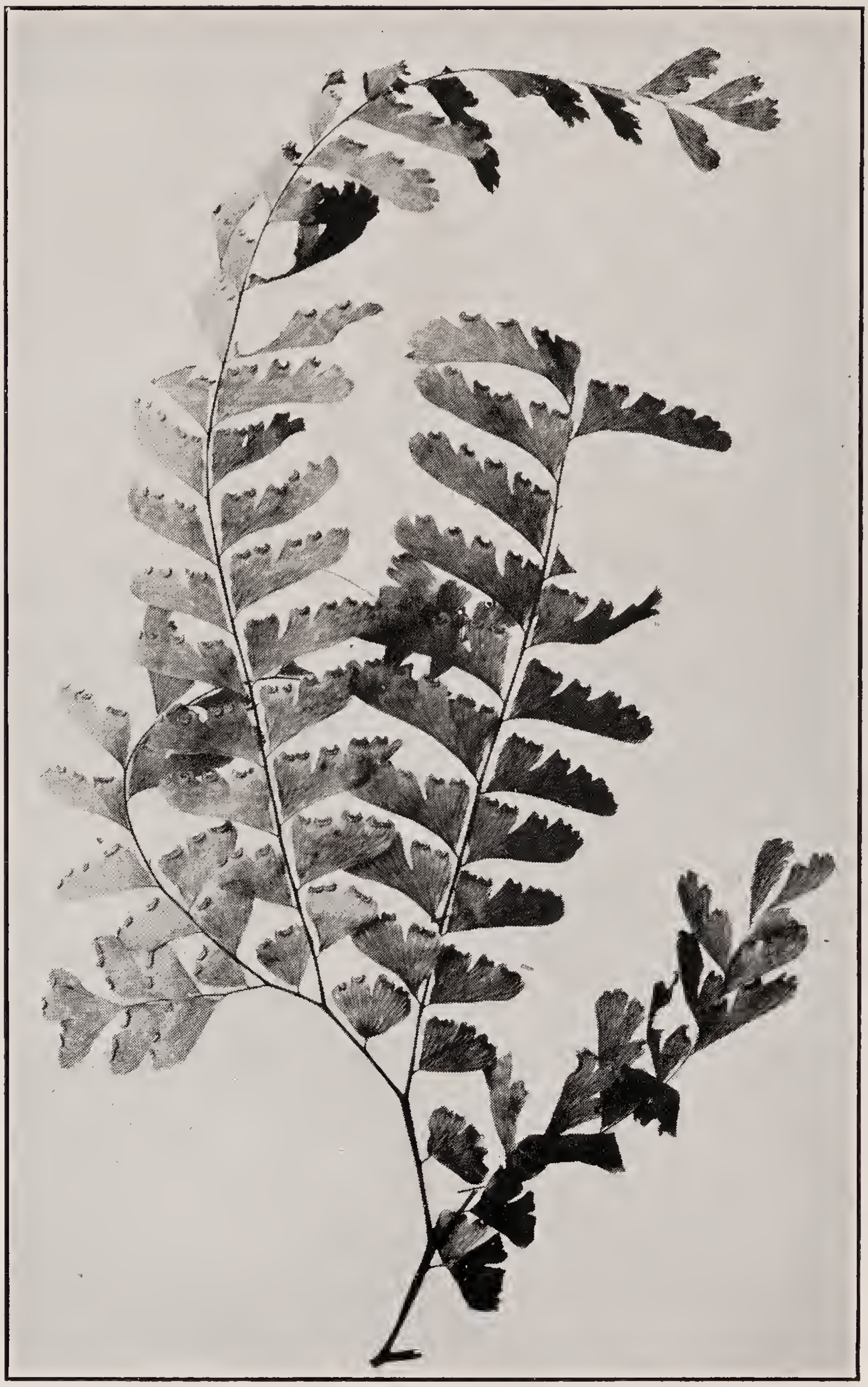

FIG. 13.—MAIDENHAIR FERN

> Vegetal medicines were, and in some tribes still are, numerous. Some of these are employed by reason of a real or fancied resemblance to the part affected, or as fetiches, because of a supposed mythical antagonism to the cause of the sickness. Thus, a plant with a wormlike stem may be given as a vermifuge; one that has many hairlike processes is used among the Hopi

to cure baldness. Among the Apache the sacred tule pollen known as *ha-dn-tin* is given or applied because of its supposed supernatural beneficial effect. Other plants are employed as remedies simply for traditional reasons, without any formulated opinion as to their modes of action. Finally, all the tribes are familiar with and employ cathartics and emetics; in some instances also diaphoretics, diuretics, cough medicines, etc. Every tribe has also knowledge of some of the poisonous plants in its neighborhood and their antidotes.

The parts of plants used as medicines are most often roots, occasionally twigs, leaves, or bark, but rarely flowers or seeds. They are used either fresh or dry, and most commonly in the form of a decoction. Of this a considerable quantity, as much as a cupful, is administered at a time, usually in the morning. Only exceptionally is the dose repeated. Generally only a single plant is used, but among some Indians as many as four plants are combined in a single medicine; some of the Opata mix indiscriminately a large number of substances. * * * Some of the plants, so far as they are known, possess real medicinal value, but many are quite useless for the purpose for which they are prescribed.

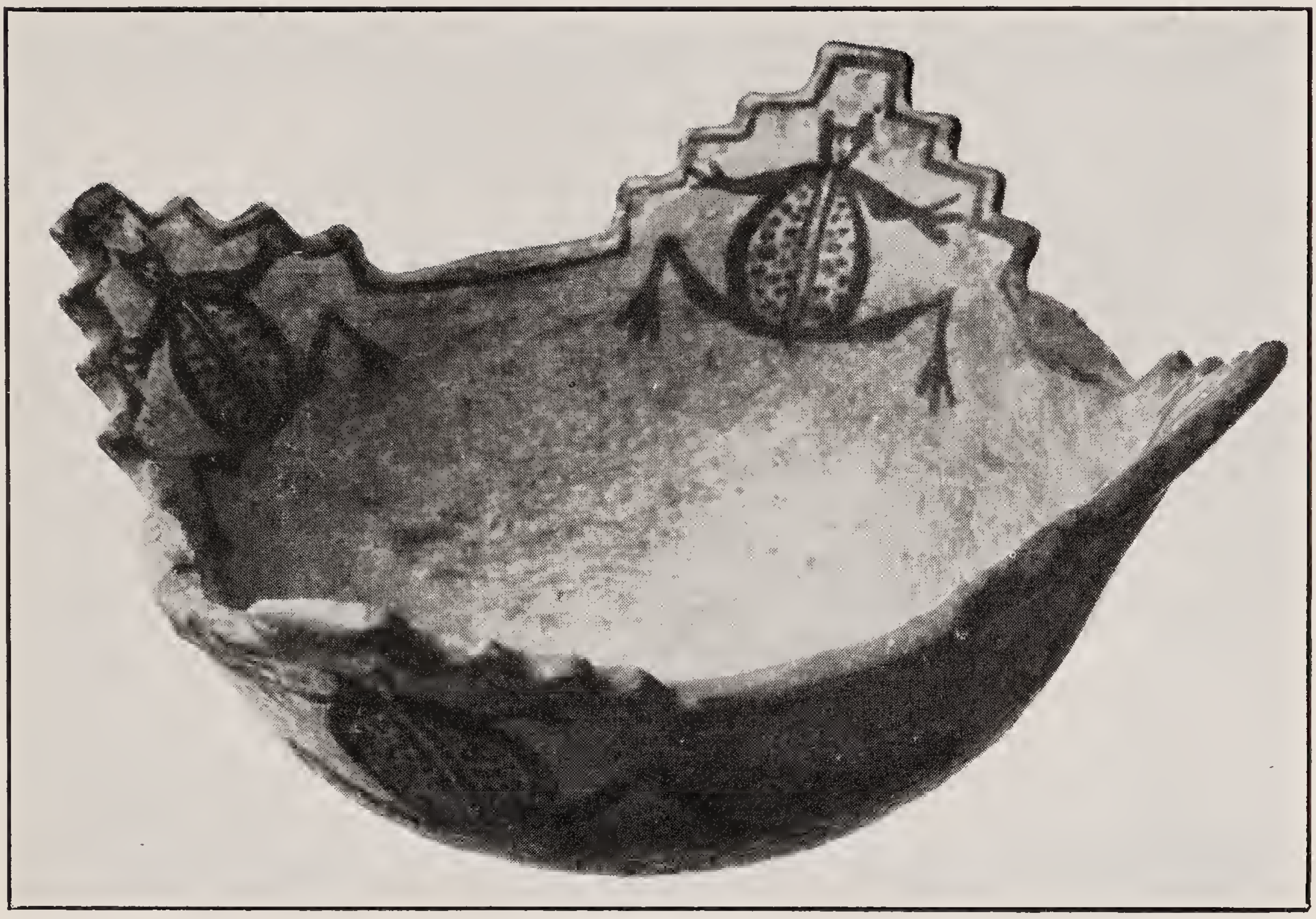

FIG. 14.—MEDICINE BOWL

Animal and mineral substances are also occasionally used as remedies. Among Southwestern tribes the bite of a snake is often treated by applying to the wound a portion of the ventral surface of the body of the same snake. The Papago use crickets as medicine; the Tarahumare, lizards; the Apache, spider's eggs. Among the Navaho and others red ocher combined with fat is used externally to prevent sunburn. The red, barren clay from beneath a campfire is used by the White Mountain Apache women to induce sterility; the Hopi blow charcoal, ashes, or other products of fire on an inflamed surface to counteract the supposed fire which causes the ailment. Antiseptics are unknown, but some of the cleansing agents or healing powders employed probably serve as such, though undesignedly on the part of the Indians.

Magic rites were observed in gathering medicinal materials. This extract from Mooney's Sacred Formulas of the Cherokees describes the practices of that tribe in this respect:

> In searching for his medicinal plants the doctor goes provided with a number of white and red beads, and approaches the plant from a certain direction, going round it from right to left one or four times, reciting certain prayers the while. He then pulls up the plant by the roots and drops one of the beads into the hole and covers it up with the loose earth. * * * the bead is intended as a compensation to the earth for the plant thus torn from her bosom. * * * In some cases the doctor must pass by the first three plants met until he comes to the fourth, which he takes and may then return for the others. The bark is always taken from the east side of the tree, and when the root or branch is used it must also be one which runs out toward the east, the reason given being that these have imbided more medical potency from the rays of the sun.

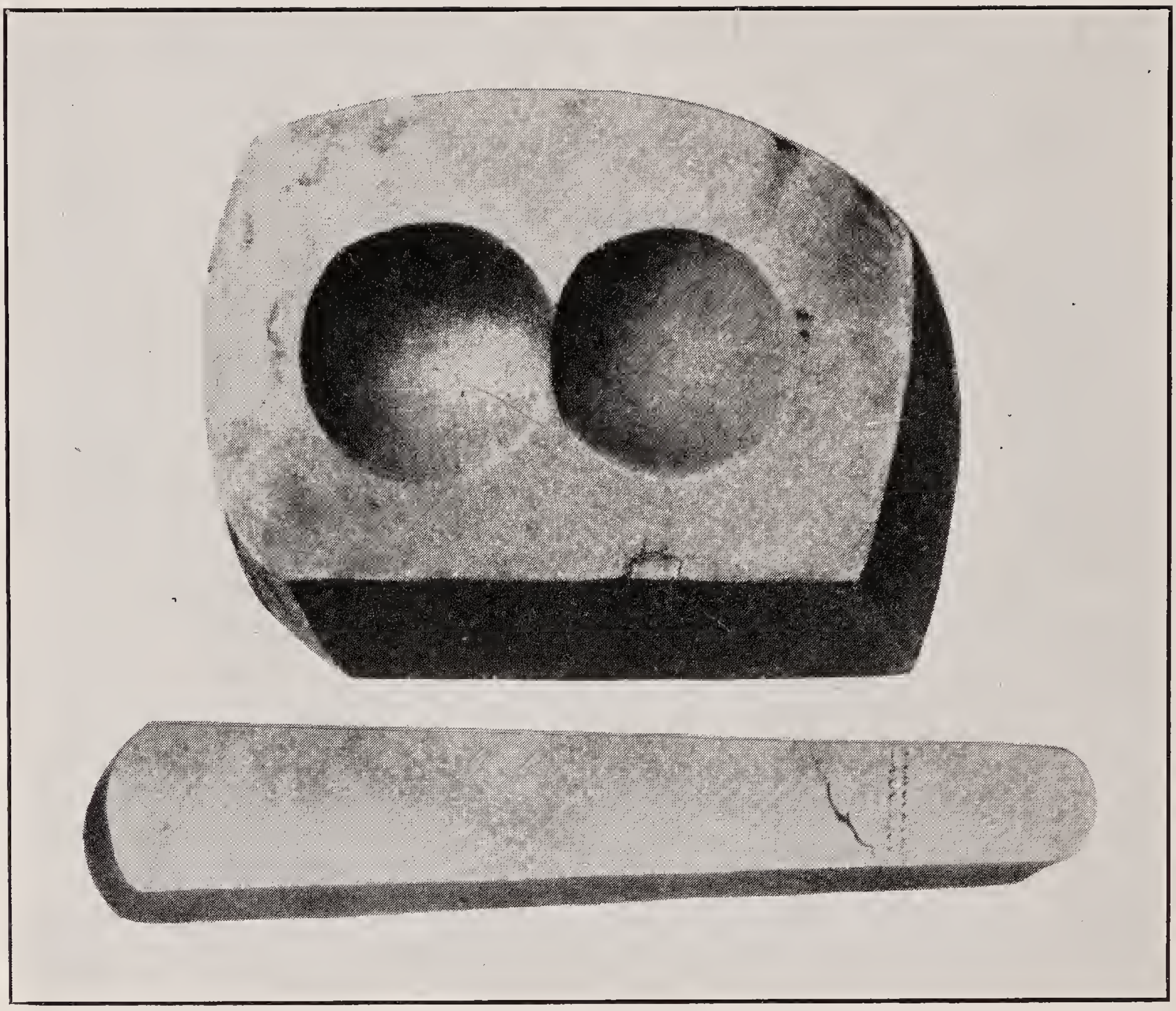

FIG. 15.—INDIAN MORTAR AND PESTLE

Some tribes were very careful in preserving drugs. Articles of materia medica were dried by hanging in lodges. They were then pounded in a mortar (fig. 15), and tied up in bags of animal tissue, such as the coat of a bladder impervious to air, and, to a certain extent, to water.

The following are a few of the Indian drugs exhibited in the National Museum's collection, in most instances to call attention to the methods of treatment rather than to the drugs themselves.

The seeds of *Sophora speciosa*, a shrub or small tree growing in Texas. Contains a poisonous alkaloid. Used as medicine by the Tonkawas. The Indians are said to have used these seeds occasionally as an intoxicant, half a bean producing delirious exhilaration followed by a long period of sleep. Cat. No. 53436, U.S.N.M.

Sage brush.—A hot decoction of this herb is used by the Araphoe Indians in fever, and by the Shoshones in venereal diseases. Cat. No. 53533, U.S.N.M.

Small white sage.—A species of *Bigelovia.* Used by the Shoshone Indians in the form of hot decoctions. Cat. No. 53534, U.S.N.M.

Gum weed.—A species of *Grindelia.* The tops are used in decoction, in venereal diseases, to be drunk freely, either hot or cold. The Araphoe Indians hang it on the tipi poles to ward off lightning. Cat. No. 53536, U.S.N.M.

Globe flower.—The root bark and small roots of *Cephalanthus occidentalis*, button bush. A Cherokee Indian remedy for cough, which has been adopted into the domestic medicine of the whites. Cat. No. 53539, U.S.N.M.

Brazilian tea.—Used as an adulterant and substitute for Chinese tea, and in the ceremonies of the Indian sorcerers. Cat. No. 53548, U.S.N.M.

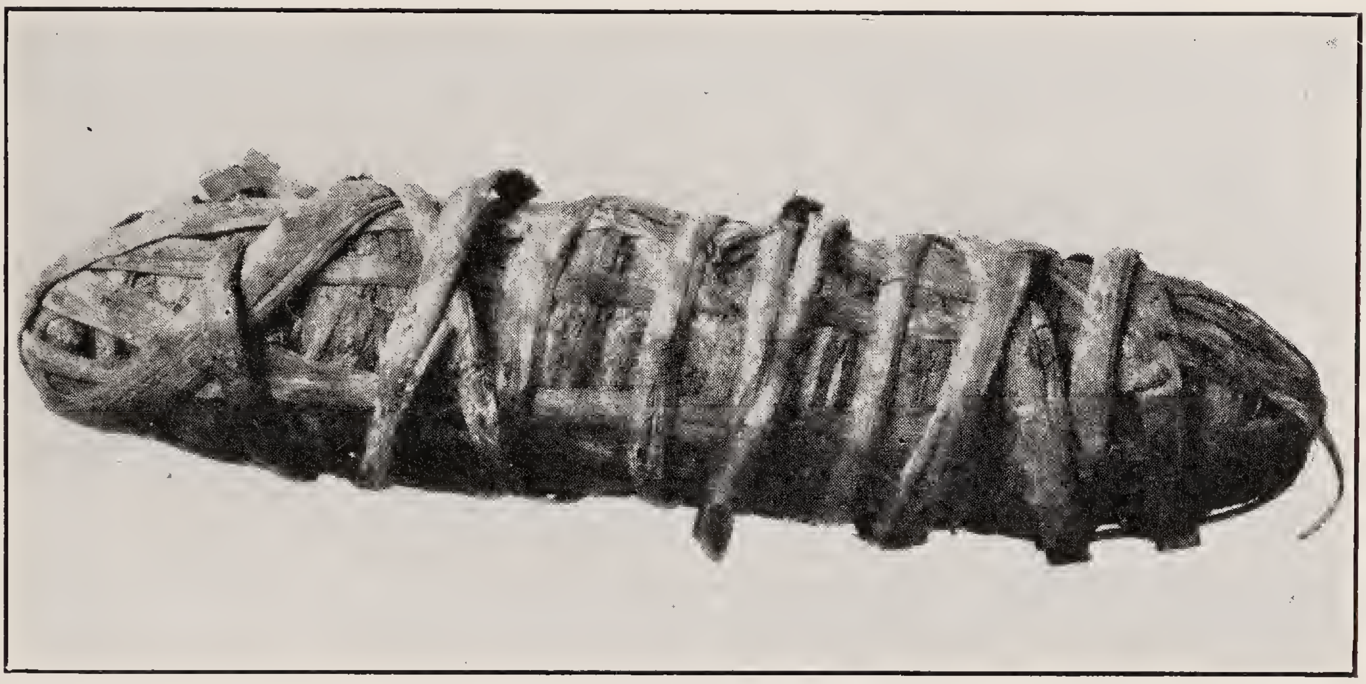

FIG. 16.—WILD-CHERRY BARK

Large white sage.—The stems and flowers of a species of *Bigelovia.* The Araphoes rub it between the hands and smell of it, to keep them awake when on the warpath. They also fumigate the tipi with it in sickness. Cat. No. 55535, U.S.N.M.

The stems and flowers of a species of *Dalea*, growing in New Mexico. A cold infusion is used as an emetic, and for bathing the body to increase strength. The plant is named for a bird, the blossoms having the color of the plumage and the stems the strength of the bird. Cat. No. 142207, U.S.N.M.

The dried flowering tops of a species of *Aplopappus.* Used in form of an infusion, one ounce to one quart of water, both internally and as a lotion. Administered for snake bite, in which case the patient must remain alone during four days; should a woman nursing her infant be looked upon, death would follow. Prescribed by medicine men of the Snake order. Cat. No. 142209, U.S.N.M.

A root used for toothache.—A piece is made very hot and held between the teeth. Given by medicine men of the Ant order. Although these medicines are often known to others than the doctors, yet the others would not dare collect or use them. Cat. No. 142210, U.S.N.M.

The top and part of the stem of a species of *Aplopappus*, growing in New Mexico. Used in the form of decoction, externally and internally, as a remedy for the irritation of the skin produced by the bites of vermin. Cat. No. 142211, U.S.N.M.

Star medicine (Psoralea esculenta).—"Stars falling to the ground penetrating the earth, becoming the tubers of the plant." The farinaceous tubers are used as an article of food. Pounded and mixed with water to the consistency of paste, they are used for poultices. Prescribed by the medicine men of the Snake order. Cat. No. 142212, U.S.N.M.

Roots.—Roots of an unknown plant found in New Mexico, growing in lowlands remote from water. Powdered and mixed with water it is given in dysmenorrhea and in protracted labor. Cat. No. 142213, U.S.N.M.

Aralia root.—Root of *Aralia nudicaulis*, used in the form of decoction as a remedy for sore eyes. Given by medicine men of the Ant order. No one else is supposed to know the medicine. Cat. No. 142214, U.S.N.M.

White bead medicine.—The stems of a species of *Dalea*. A decoction of the plant is used both internally and as a lotion in various diseases. It is emetic in large doses. Cat. No. 142215, U.S.N.M.

Yellow-rooted grass.—For toothache. The disease spirit is believed to be a worm which has wrapped itself about the root of the tooth. The doctor invokes in turn a red spider, a blue spider, a black spider, and a white spider, of the Sun Land, to let down threads from above and draw up the intruding worm. After each invocation to a spider follows a prayer to the spirit of fire. The prayers having been said, the doctor blows upon the tooth or outside of the jaw a decoction of the herb. Cat. No. 143092, U.S.N.M.

Black snakeroot (Aristolochia serpentaria).—A decoction of the root is blown upon the patient during the ceremonial of exorcism by the medicine man. It is also used for coughs; chewed and spit upon the wound for snake bite; and put in the cavity of a decayed tooth for toothache. Cat. No. 143156, U.S.N.M.

Crane's-bill (Geranium maculatum).—A Cherokee remedy. Used in decoctions with frost grape to wash the mouths of infants affected with "thrush." The root of this plant is recognized as an efficient astringent. Cat. No. 143157, U.S.N.M.

Beggar's-lice.—The whole plant of a species of *Cynoglossum*. A Cherokee remedy. A decoction of the root or top drunk for kidney disease; the bruised root with bear's oil used as an ointment for cancer. Because of the sticking quality of the burs, a decoction of the plant is taken to aid the memory and in the preparation of love charms. Cat. No. 143158, U.S.N.M.

Wild-cherry bark.—For intermittent fever. This disease is believed to be caused by the colonization of malicious insects or worms under the skin. In the preparation of the medicine, the bark is infused in water into which seven coals of fire have been put. The patient is placed with his head toward the rising sun; the doctor, standing in front, with medicine cup in hand, invokes in succession the spirits of the air, of the mountain, of the forest, and of the water; after each invocation he takes some of the liquid in his mouth and blows it on the head, the right shoulder, the left shoulder, and the breast of the patient. The ceremony may be repeated each day for four days (fig. 16). Cat. No. 143160, U.S.N.M.

Spurge (*Euphorbia hypericifolia*).—A Cherokee remedy. The juice is used as a purgative; rubbed on the heads of children for skin eruptions; made into an ointment for sores. Cat. No. 143162, U.S.N.M.

Galega virginiana.—"They (the roots) are tough." Common names: Catgut, turkey pea, goat's rue, devil's shoestrings. A Cherokee remedy. Women wash their hair in a decoction of the roots to prevent its breaking or falling out, because these roots are very tough and hard to break; from the same idea ball players rub the decoction on their limbs, after scarification. Cat. No. 143163, U.S.N.M.

Senega (Snakeroot).—The roots of *Polygala senega.* Used by the Seneca Indians as a remedy for the bite of the rattlesnake. Introduced into medicine of the whites as a stimulating expectorant and diuretic, useful in pneumonia, asthma, and other pulmonary affections. Cat. No. 50389, U.S.N.M.

Yellow root.—To hasten childbirth. The doctor, standing by the patient, repeats certain phrases to the effect that a horrible old man or woman is coming for the purpose of hurting the child. He then takes some of a decoction of yellow root in his mouth, and blows it upon the top of the woman's head, upon the breast, and upon the palm of each hand. Cat. No. 50525, U.S.N.M.

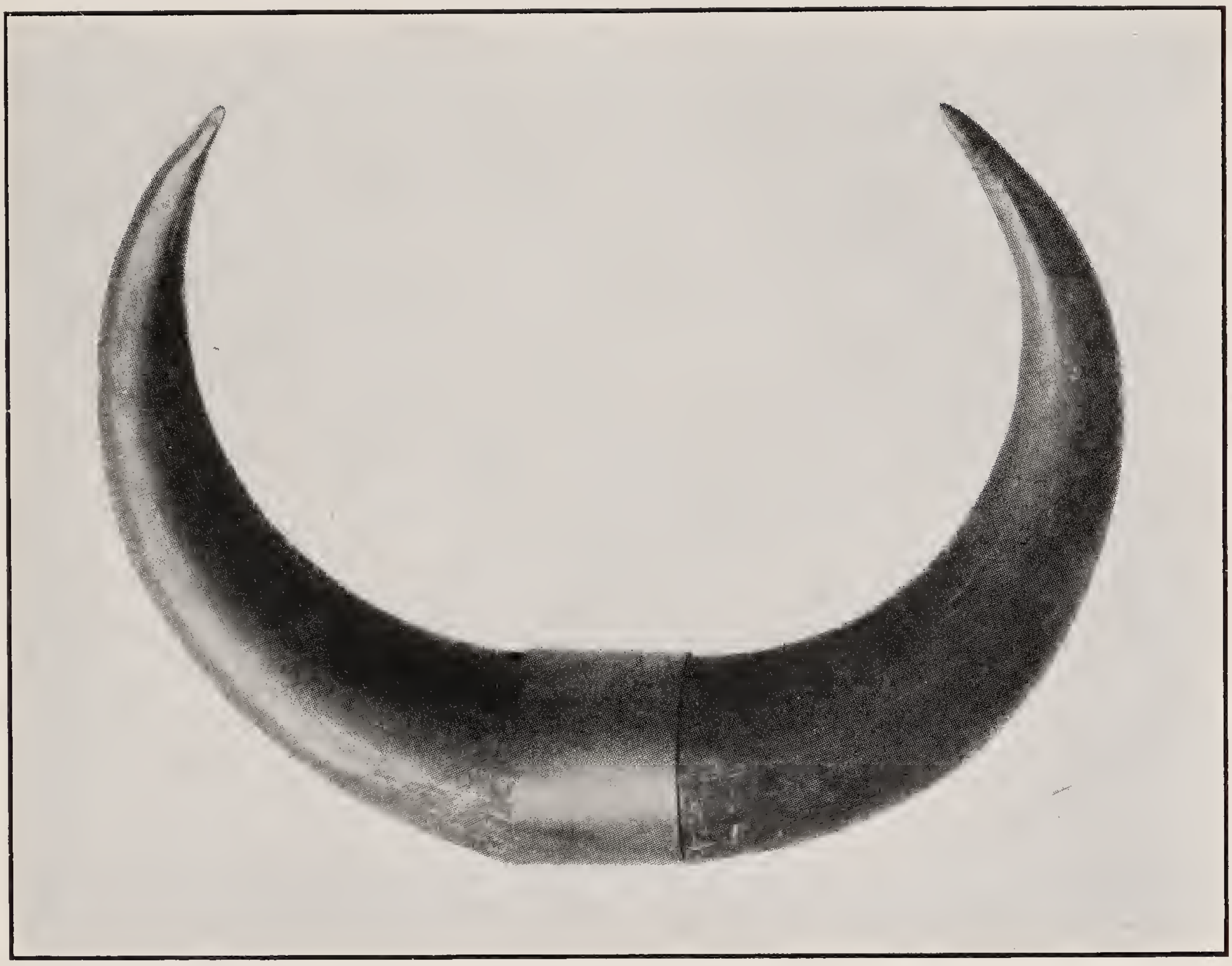

FIG. 17—HORNS

SURGICAL MEDICINE

The Indians' knowledge of anatomy was, in a great measure, comparative, having been derived from an acquaintance with the structure of the higher order of animals killed in the chase and used as food. Their skill in curing wounds consisted chiefly of close attention to the injured part, and the frequent application of washes which kept the wound clean. Some dexterity was shown in the treatment of fractures and superficial wounds, and the mechanical means of curing consisted of bandaging, bonesetting, cauterizing, counterirritation, cupping (by sucking), cutting, poulticing, scarifying, and venesection. Splints were made of reeds or the bark of trees and fastened to broken bones with bandages in order to prevent motion of the fragments; also in a great degree the contraction of the muscles and consequent shortening of the limb. Hemorrhages were treated with applications of drying powder of vegetable origin. This powder was pressed into a wound and retained with a bandage. Incised wounds were closed with sutures made of the inner bark of certain trees, or the long tendon of the deer, which was removed after several days.

A sudatory (sweat) bath was taken medicinally, and also as a preparation for certain ceremonial observances. Figure 18 is an illustration of this bath. The tent is made with a bent pole covered with blankets or skins. In the illustration the blanket is removed from the front to show the interior. The patient is seated inside upon the ground, with a jug of water by his side, while an assistant is heating stones at a fire outside the tent. The assistant passes the hot stones to the bather, who fills his mouth with water from the jug and blows it upon the stones, where it is instantly converted into vapor which fills the tent and speedily induces perspiration. While in this sweating stage it is customary for the bather to plunge into a pool of cool water, if one is near.

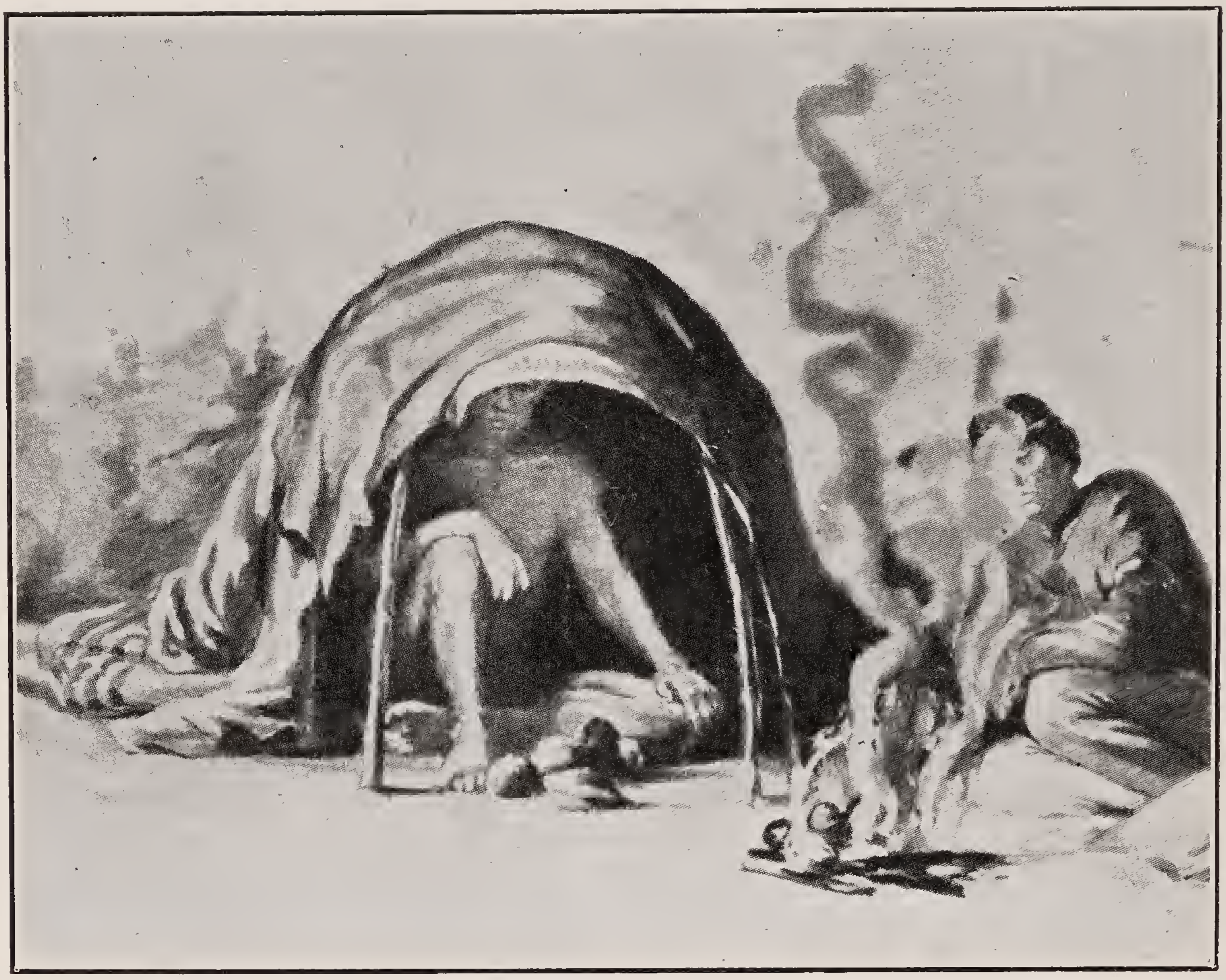

FIG. 18.—SUDATORY (SWEAT) BATH

Venesection was resorted to in the treatment of certain diseases and was performed by the aid of a piece of flint, which was driven into a vein.

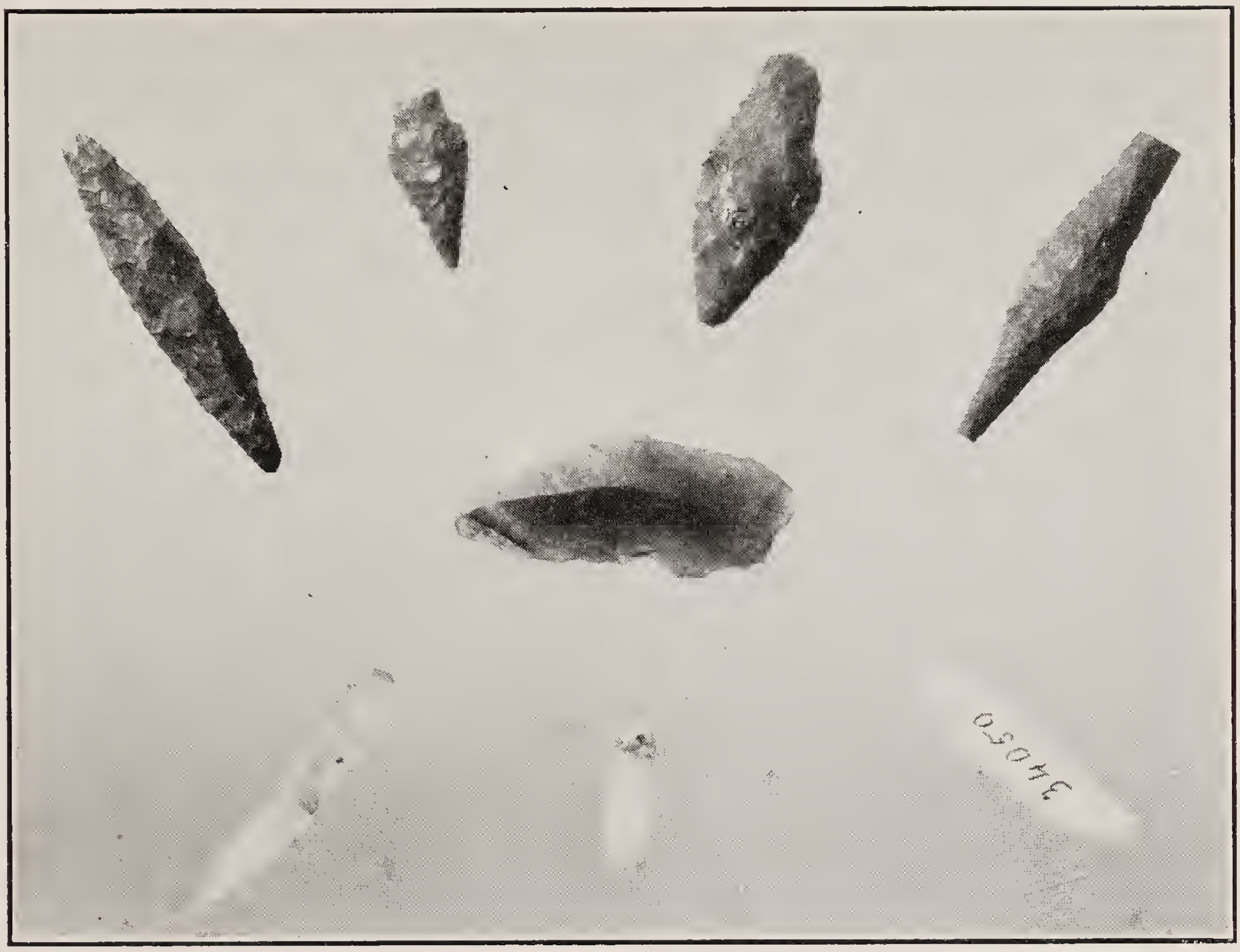

FIG. 19.—LANCETS AND SCARIFICATOR

Stone lancets.—Thin chips of flint, about one and one-half inches long and one-quarter inch wide, used for surgical operations (fig. 19). Cat. No. 34050, U.S.N.M.

Stone lancets.—Small flint arrowheads used by the Indians for bloodletting (fig. 19). Cat. No. 127758, U.S.N.M.

Scarificator.—A small flake of flint. Used for making shallow incisions in the skin for the purpose of drawing blood, and as a preliminary to the applica-

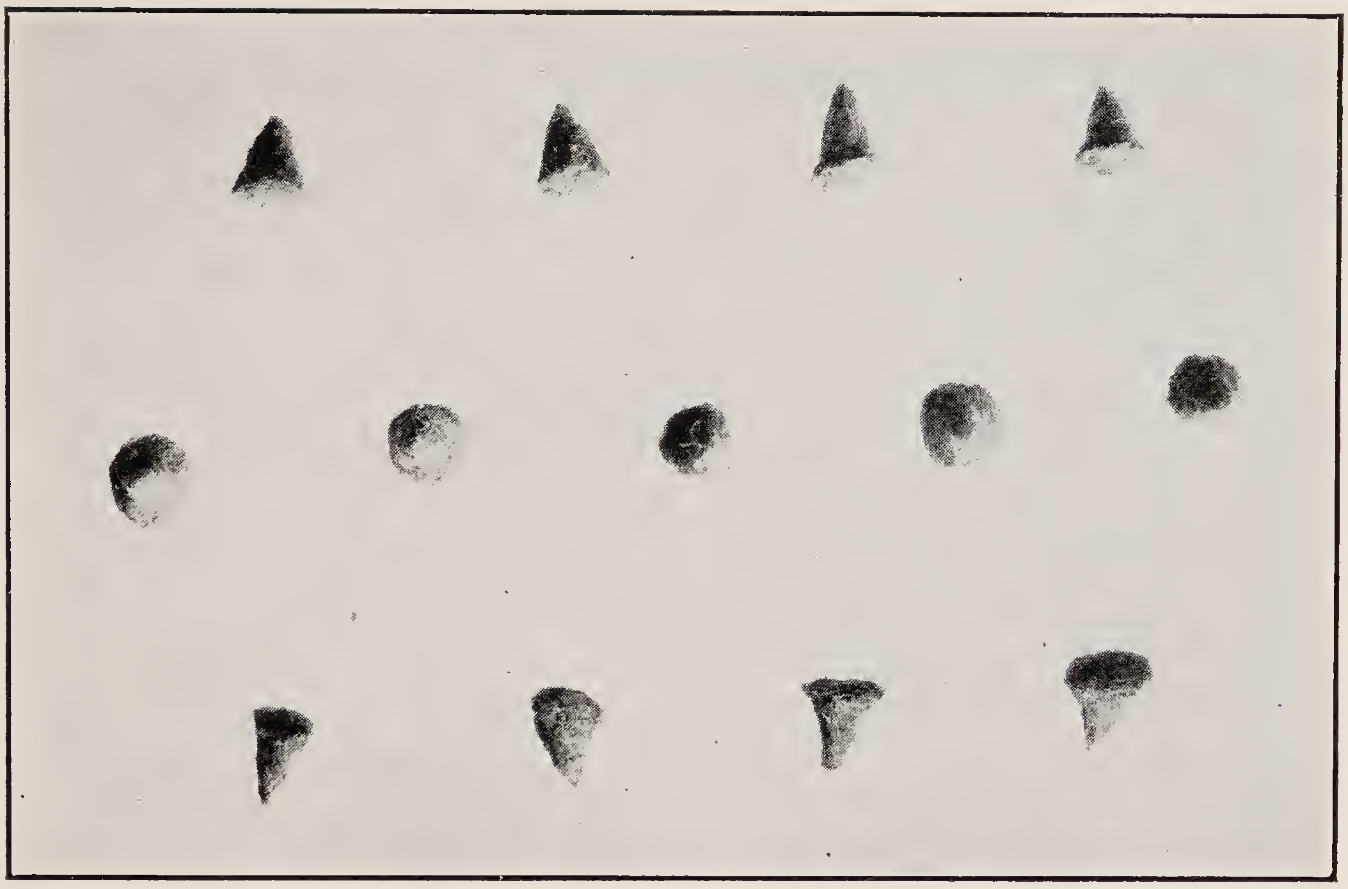

FIG. 20.—MOXA

tion of medicine to strengthen the muscles preparatory to ball games. The scratches were usually made in certain set figures (fig. 19). Cat. No. 141166, U.S.N.M.

Cupping, or local bleeding, was performed after scarification with a piece of flint. A horn, cleaned and perforated at the tip, was used for this purpose. The mouth was applied to the hole in the tip of the horn and a vacuum formed by suction. The Indians cupped very satisfactorily with this simple contrivance, and this remedy was resorted to for acute pain in almost any part to which the horn could be applied. Whatever benefit there may have been from cupping, the Indians probably thought its virtue consisted in the fact that a malevolent spirit or foreign body was thereby drawn out.

Moxa.—A form of cautery usually consisting of combustible vegetable fiber which is burned in contact with the skin as a counterirritant. The specimens pictured in figure 20 were made by the Klamath Indians. Cat. No. 141441, U.S.N.M.

Historical Milestones

—*in Occupational Medicine and Surgery*—

ALFRED H. WHITTAKER, M.D., F.A.C.S.,
and
DAVID J. SOBIN, M.D., M.S.,
Detroit

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Historical Milestones

—*in Occupational Medicine and Surgery*—

ULRICH ELLENBOG

ALFRED H. WHITTAKER, M.D., F.A.C.S.,
and
DAVID J. SOBIN, M.D., M.S.,
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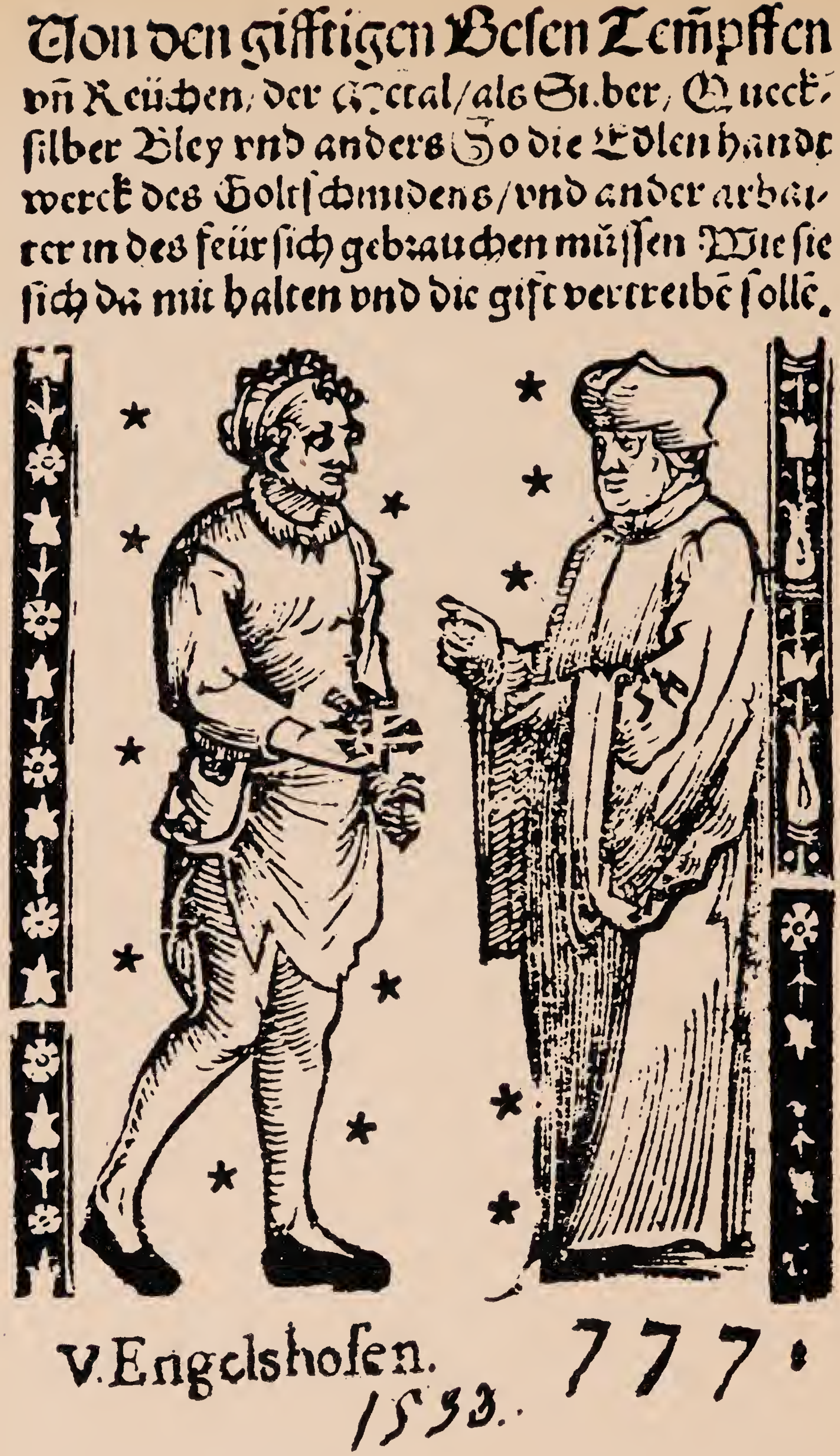

Von den gifftigen Beſen Tem̄pffen vñ Reüchen/ der Metal/als Silber/ Queckſilber Bley vnd anders So die Edlen handtwerck des Goltſchmidens/vnd ander arbaiter in des feür ſich gebrauchen müſſen Wie ſie ſich da mit halten vnd die gift vertreibē ſollē.

V. Engelshofen. 1533. 777.

Concerning poisons and the evil vapours of smoke and of metals, such as silver, quicksilver, lead, and others which the worthy trade of the goldsmith and other workers are compelled to use. How they should conduct themselves concerning these matters and how to dispel the poison.

Historical Milestones

—*in Occupational Medicine and Surgery*—

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SEVENTEEN years before Columbus made his historic discovery in the search for a new route to the Indies, ULRICH ELLENBOG was troubling his mind with the occupational hazards of the goldsmiths and other workers in metals. He had already written the manuscript and was searching for a method to spread his message when opportunity rapped on his door. A need had arisen in Augsburg for someone to sponsor the new-fangled printing press. Ellenbog saw his chance and helped to found the press of the Abbey of SS. Ulrich and Afra in that city. For the 60 years since Gutenberg's invention, or until about 1500, books resembled the old manuscripts in form and content; but with the founding of the press at Augsburg books took on a more popular character, were published in the everyday vernacular, and were intended for the lay public. This change in approach heralded the end of the Middle Ages, but it is difficult to state with certainty where and when this period terminated as different countries and different provinces accepted the changes with different degrees of alacrity; however, in general, the end of the incunabula marks the beginning of the Renaissance.

ULRICH ELLENBOG was born at Feldkirch, Austria in 1440, and died at Memmingen in 1499. He was a Doctor of Medicine, and physician to the Bishop and Chapter of the Augsburg Cathedral from 1470 to 1478. It was during these few years that the press of the Abbey of SS. Ulrich and Afra was founded in Augsburg under his direction. In 1472 he wrote the manuscript of the book described below,* which was published posthumously a half century later. He wrote several other medical books and possessed a large library which was still extant, in part, at the opening of the World War II. He bequeathed his books and unpublished manuscripts to his son, Nicolaus, a Benedictine Monk at Ottobeuren, where some of his books are still preserved. Only three of Ellenbog's manuscripts were ever published, among which is the booklet at hand, which was formerly thought to have been printed after the sack of the Ottobeuren Library during the peasant uprising in 1524.

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* The first printed thesis dealing with occupational health—there being two copies extant, of which this one is in the library of the senior author, the other in the University Library, Munich.

Of Ellenbog's booklet, Dr. C. F. Mayer, Librarian of the Army Medical Library, has this to say:

"The type of letters in Ellenbog's work was the chief evidence that the book was printed by Melchior Ramminger, of Augsburg. The date of publication has been determined with the aid of the curious title page of which you sent me a photograph. This cut, as I now know definitely, represents a shoemaker and cannon, and was first used by the printer in 1523 as the title page of a book written by Hans Sachs, the shoemaker poet, and called: DISPUTATION ZWICHEN EINEM CHORHERREN UND SCHUCHMACHER DARIN DAS WORT GOTTES UND EINRECHT CHRISTLICH WESEN VERFOCHTEN WURDT. I am still unable to tell who 'V. Engelshofen' is; the three 'sevens' in the lower right hand corner have no special meaning and serve possibly the purpose of balancing the page. The written figure *1553* may be somebody's guess as to the date of printing, which as I mentioned, has been determined by circumstantial evidence and accepted to be between 1523 and 1524."

This little eight-page booklet was first translated by C. Barnard and published in the Lancet, 1932 (p. 270), however, the numerous minor discrepancies between his translation and our own makes it interesting to publish Dr. Ernst's version. The differences in translation are due to the fact that the booklet was published in the vernacular of the day, that many of the words are no longer in the dictionary, and that even some of the letters are no longer used. An analogy would be to publish Beowulf or Chaucer in the original version and ask the medical student to read it.

*CONCERNING THE POISONOUS, EVIL VAPOURS AND FUMES OF METALS, SUCH AS SILVER, QUICKSILVER, LEAD AND OTHERS WHICH THE WORTHY TRADE OF THE GOLDSMITH AND OTHER WORKERS ARE COMPELLED TO USE. HOW THEY MUST CONDUCT THEMSELVES CONCERNING THESE MATTERS, AND HOW TO DISPEL THE POISON.

TO THE ROYAL SUBSIDIARIES AND WORTHY TRADE OF GOLDSMITHS OF THE IMPERIAL CITY OF AUGSBURG.

My voluntary and conscientious service shall be ready for you all. Since I, Ulrich Ellenbog, Doctor of Medicine at Feldkirch, at present chief physician of the Exalted Chapter at the Augsburg Cathedral, have considered the great and highly injurious harm which faces this master trade through the smoke and fumes of the materials with which the tradesman is compelled to work. Therefore I do not wish to withdraw myself and remain aloof to the masters of this trade, but to serve them by giving assistance and advice in order that they may not receive too severe an illness which is produced by these fumes.

I beg of you with all my heart to take this, my modest advice, written with my own hand in all good will and friendship. Nothing more would I desire than to serve each and all with friendly service. Dated: August 6, 1473.

CONCERNING COAL

Modern manufacturing plants are using coal for fuel, the smoke and fumes of which are poisonous, especially when the coal is somewhat damp. When these vapours are heavy and accumulate above the coal they explode. When a person loiters near this fire for a period of time his countenance becomes pallid, so that he appears green and blue, his eyes dim, and he struggles for air. This vapour causes a heavy unnatural sleep, and at times heavy limbs, and if one tarries a longer period of time he becomes palsied.

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All this does not require much damp coal for it will burn just as well in the open air. In the winter time, if you have a fire of coal in the shop or factory, then do not close the windows but guard yourself against the vapours as much as possible. This is my advice. The workers reveal that they are fully poisoned and feverish when they live and sleep a long time in an enclosure where there is coal vapour, as has been proved by some leaders in Medicine. When the employers or masters demand that coal fires be lit, then blow them up in the open air and lay white incense upon it or sprinkle a little wine over it, for this causes the poison and the danger of the vapour to be diminished.

CONCERNING THE VAPOURS OF QUICKSILVER, LEAD AND OTHER METALS WITH WHICH THE GOLDSMITH ORDINARILY LABOURS

The profession of Medicine holds that the vapour of every metal retains the natural complexion and power of the kind from which it arises. The pharmacists usually prepare distilled water of a warm nature if they derive them from warm herbs. Accordingly they also believe that the vapour and smoke of each metal retains the natural complexion and power from which it arises.

Now it is true that oftentimes the vapours and smoke are more powerful than the metal or mineral, as it appears when one sublimates aquafortis, also when one distils brandy for there the vapour is much stronger than the ammonia alone or the wine wherefrom the brandy is made. Therefore men call the vapour spirits, that is ghosts for through their appearance and strength they always work more strongly than the body from which they are drawn. Now it is obvious in natural history that the nature of quicksilver is rather cooling and moist in appearance and action, lead also is cooling and moist, the same is true of silver, it is of a cool nature; likewise antimony and litharge are cold. Wherefore I state that the smoke and vapour of such metals chill greatly the man who has to work therewith. Therefore when ye masters and men work with lead, and when ye gild, guard yourselves against the vapours and smoke for it is poisonous to you. This, my advice, is that they should be kept in the open air as much as possible, and never in a tight enclosure. Workers should not hold their heads above this vapour but should wear a mask. The vapour of quicksilver, silver, and lead are a cooling poison, for they make a heaviness and tightness in the chest, burden the limbs and often lames them, as one can often see in the foundries where men work with large quantities of these metals.

When one Wishes to Reduce the Harm or Injury of These Vapours

When you are engaged in the filing or plating of metal have musk by you and smell of this much and often, for the vapour of the musk by its warmth suppresses the coldness of the smoke of lead, silver, and quicksilver. Also the musk, by virtue of the property of strengthening the heart and brain, wards off and assuages the harm from the vapour of lead and quicksilver; thus these vapours cannot harm you.

Likewise, any time you goldsmiths linger in the aforesaid fumes, keep in your mouth one of the following pieces, which ye will, and chew it so that by the strength of these vapours will be corrected and lessened the strength of the vapour that you draw in with your breath. Thus these vapours will not harm you, as they would did you not keep these pieces in your mouth. And there are the pieces (*antidotes*), juniper berries, white root of torimetal, elecampane, rue, dittany (and others). Many other pieces are commended by the physicians against these poisonous vapours, but these aforesaid are good for you, and common enough so that you can get them at slight cost. Several teachers of Medicine highly commend the emerald, which one shall also hold in the mouth, for it withstands the poisoning by these vapours. Also, dear craftsmen, if one is gilding or plating, and has inhaled much vapour so that he feels distressed and fears harm, then he shall on the following day, on a fasting stomach, perspire in bed and then take a good old theriac, the size of a large hazel nut, with wine; thus will the poison which has come into him through his work with this metal be driven from his system. The doctors also recommend that those working with metals or gilding should drink vermouth wine, through the heat of which will the evil chill of the vapours be depressed, and whoever has no vermouth in his cellar may in a day or seven hours make it by dropping wormwood into wine. If however, one cannot perspire then he should go on an empty stomach to the bathroom after having taken the theriac mentioned above.

CONCERNING THE VAPOURS OF AQUAFORTIS which are warm, and very sharp, and against the vapours or litharge and antimony, which are of a cold nature, you shall guard especially well as is described above in connection with lead and quicksilver.

AGAINST THE VAPOURS OF VERDIGRIS, SALTPETER AND SAL AMMONIAC YOU MUST be very careful and guard yourself while working with pale gold, for these vapours are very sharp and poisonous. To correct and lessen their poison one should drink half a dram of bole mixed with wine and rose water. Herewith God keep us all in good health. Amen.